2006 LOUISIANA AMBIENT AIR MONITORING NETWORK

ANNUAL REPORT

Louisiana Department of Environmental Quality
Office of Environmental Assessment
Air Quality Assessment Division
Air Analysis Section

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National Ambient Air Quality Standards (NAAQS)

In 1990, the Clean Air Act was amended to set National Ambient Air Quality Standards for pollutants considered harmful to health and the environment. This Act established two types of standards. Primary standards were established to protect public health, including "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation and buildings. NAAQS have been codified for six "criteria" pollutants in 40 Code of Federal Regulations (CFR) Part 50. These standards are summarized in Table 1.

When comparing data obtained at monitoring stations to standards, it is often useful to calculate a design value. Design values (DVs) are statistics that describe the air quality status of a given area relative to the NAAQS. Design values are especially helpful when the standard is exceedance-based (e.g. 1-hour ozone, 24-hour PM_{10}, etc.) because they are expressed as a concentration instead of an exceedance count, thereby allowing a direct comparison to the level of the standard. DVs are often based on multiple years of data, ensuring a stable indicator. They are also often used to classify nonattainment areas, assessing progress towards meeting the standard. DVs are computed and published annually by EPA's Office of Air Quality Planning and Standards and reviewed in conjunction with the EPA Regional Offices.

Louisiana NAMS/SLAMS Network Overview

The Louisiana Department of Environmental Quality's (LDEQ) Air Analysis section has operated National Ambient Monitoring Stations (NAMS) and State and Local Ambient Monitoring Stations (SLAMS) as a requirement of 40 CFR Part 58. These stations measure ambient air concentrations of those pollutants for criteria pollutants. Conformance of the network to Appendix D (Network Design Criteria) and Appendix E

(Probe and Path Siting Criteria) is determined using an Annual Review of the air quality surveillance system which states are required to provide for in 40 CFR 58.20 (d). This review has several goals:

- Determine how well the network is achieving its required air monitoring objectives;
- Determine how well the network is meeting the needs of the data users;
- Determine how (if) the network should be modified to continue to meet its monitoring objective and data needs (through termination of existing stations, relocation of stations, or establishment of new stations); and
- Investigate ways to improve the network to ensure that it provides adequate, representative and useful air quality data.

The LDEQ currently operates:

- 23 ozone monitors,
- 17 Federal Reference Method (FRM) $PM_{2.5}$ samplers,
- 9 TEOM® $PM_{2.5}$ samplers,
- 2 $PM_{2.5}$ chemical speciation samplers,
- 12 nitrogen oxides monitors,
- 5 sulfur dioxide monitors,
- 1 carbon monoxide monitor, and
- 2 PM_{10} monitors.

Refer to Table 2 for a list of all parameters operated at each site. Figure 1 shows the geographical location of the sites.

The Louisiana's ambient air monitoring network underwent minimal operational changes in 2006. The Vidallia site was removed from the database in December of 2006 due to consistently low $PM_{2.5}$ readings. PM_{10} monitors were also removed from City Park, Water Plant, and Lulling in the Southeast Region during the year.

Future Plans

Under EPA's proposed National Core Network (NCore) design guidelines, the state of Louisiana is required to operate one NCore level 2 site, which will be Capitol site. This will result in the addition of SO_2 and CO trace gas monitors at Capitol to study ozone precursors. The remaining sites in the state will all be NCore level 3 sites.

Regarding the upcoming PM_{coarse} standard, the LDEQ will continue to work with the EPA as they finalize the requirements of the new standard. As of the end of 2006, the National Ambient Air Quality Standard (NAAQS) for PM_{coarse} has not been proposed.

Table 1. National Ambient Air Quality Standards

Pollutant	Primary Standards		Secondary Standards	
	Level	Averaging Time	Level	Averaging Time
Carbon Monoxide	9 ppm (10 mg/m^3)	8-hour(1)	None	
	35 ppm (40 mg/m^3)	1-hour(1)		
Lead	1.5 µg/m^3	Quarterly Average	Same as Primary	
Nitrogen Dioxide	0.053 ppm	Annual	Same as Primary	
	(100 µg/m^3)	(Arithmetic Mean)		
Particulate Matter (PM_{10})	150 µg/m^3	24-hour(2)	Same as Primary	
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3	Annual(3)	Same as Primary	
		(Arithmetic Mean)		
	35 µg/m^3	24-hour(4)	Same as Primary	
Ozone	0.085 ppm	8-hour(6)	Same as Primary	
	0.12 ppm	1-hour(7)	Same as Primary	
Sulfur Dioxide	0.03 ppm	Annual	0.5 ppm	3-hour(1)
		(Arithmetic Mean)	(1300 µg/m^3)	
	0.14 ppm	24-hour(1)		

Units of measure for the standards are parts per million (ppm) by volume, milligrams per cubic meter of air (mg/m^3), and micrograms per cubic meter of air (µg/m^3).

(1) Not to be exceeded more than once per year.

(2) Not to be exceeded more than once per year on average over 3 years.

(3) To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m3.

(4) To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m3 (effective December 17, 2006).

(5) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm. (effective 60 days after publication in the Federal Register)

(6) (a) To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.

(b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.

(7) (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is $\leq$ 1.

(b) As of June 15, 2005 EPA revoked the 1-hour ozone standard in all areas except the 8-hour ozone nonattainment Early Action Compact (EAC) Areas.

Table 2. 2006 Louisiana Ambient Air Monitoring Sites

SITE NAME & ABBREVIATION ADDRESS AQS CODE	PARISH	O_3	NO_X	SO_2	CO	PM_{10}	$PM_{2.5}$ (FRM)	$PM_{2.5}$ (TEOM)
ALEXANDRIA (AL) 8105 Tom Bowman Dr. 220790002	Rapides						SLAMS	
BAKER (BK) Highway 964 220331001	East Baton Rouge	NAMS	SLAMS				SPMS	
BATON ROUGE-CAPITOL (BC) 1061-A Leesville Ave 220330009	East Baton Rouge	NAMS	SLAMS	NAMS	SLAMS		SLAMS (DUP)*	SPMS
BATON ROUGE-LSU (BR) East End Aster Lane 220330003	East Baton Rouge	SLAMS	SLAMS					
BAYOU PLAQUEMINE (BP) 65180 Belleview Road 220470009	Iberville	SPMS	SPMS				SLAMS	
CARLYSS (CR) Hwy 27 & Hwy 108 220190002	Calcasieu	SLAMS						
CARVILLE (CV) Hwy 141 220470012	Iberville	SLAMS	SPMS					
CITY PARK (NC) Florida & Orleans Ave 220710012	Orleans							SPMS
CONVENT (CT) St. James Courthouse La Hwy 44 @ Canatella 220930002	St. James	SLAMS						
DIXIE (DX) Haygood Road 220170001	Caddo	NAMS						
DUTCHTOWN (DT) 11153 Kling Road 220050004	Ascension	SPMS	SPMS					
FRENCH SETTLEMENT (FS) 16627 Perrilloux Lane (at Highway 16) 220630002	Livingston	SPMS	SLAMS					SPMS
GARYVILLE (GV) E. Azaela St. 220950002	St. John the Baptist	SLAMS						
GEISMAR (GM) Highway 75 220470005	Iberville						SLAMS	
GROSSE TETE (GT) 19145 Sydney Rd. 220470007	Iberville	SPMS	SPMS					
HAMMOND (HM) 21549 Old Covington Hwy 221050001	Tangipahoa						SLAMS (DUP)	

Table 2. 2006 Louisiana Ambient Air Monitoring Sites (cont.)

SITE NAME & ABBREVIATION ADDRESS AQS CODE	PARISH	O_3	NO_X	SO_2	CO	PM_{10}	$PM_{2.5}$ (FRM)	$PM_{2.5}$ (TEOM)
HAHNVILLE (HV) 1 River Park Drive 220890003	St. Charles	SLAMS						
HOUMA (HO) 4047 West Park Ave. 221090001	Terrebonne						SLAMS	
KENNER (KN) 100 West Temple Pl 220511001	Jefferson	NAMS	NAMS				SLAMS	SPMS
LAFAYETTE (LI) State Police Troop I 121 E. Pont Des Mouton 220550006	Lafayette						SLAMS	
LAFAYETTE-USGS (LY) 700 Cajundome Blvd. 220550007	Lafayette	SPMS					SLAMS	
LAKE CHARLES-MCNEESE UNIV. (L6) Common & E. McNeese 220190010	Calcasieu						SLAMS	
MARRERO (MO) Patriot & Allo St. 2205112001	Jefferson						SPMS	
MONROE (MR) Airport Station 220730004	Ouachita	SLAMS		SLAMS			SLAMS	
NEW ROADS (NR) Highway 415 220770001	Pointe Coupee	SLAMS						
PORT ALLEN (PA) 3758 Highway 1 221210001	West Baton Rouge	SLAMS	SLAMS	SLAMS		NAMS	SLAMS	SPMS
PRIDE (PE) 11245 Port Hudson 220330013	East Baton Rouge	SPMS	SLAMS					SPMS
SHREVEPORT-AIRPORT (SA) 1425 Airport Drive 220150008	Bossier	NAMS		SLAMS				SPMS*
SHREVEPORT-CALUMET (SC) Midway Street 220170008	Caddo					NAMS	SLAMS (DUP)	
THIBODAUX (TD) 194 Thoroughbred Park Dr. 220570004	Lafourche	SLAMS						SPMS
VIDALIA (VL) 2005 Billy Deal Lane 220290003	Concordia						SPMS	
VINTON (VT) 2284 Paul Bellow Rd. 220190009	Calcasieu	SPMS					SPMS	
WESTLAKE (WL) 2646 John Stine Rd. 220190008	Calcasieu	SLAMS	SPMS	SLAMS				SPMS

Table 2. 2006 Louisiana Ambient Air Monitoring Sites (cont.)

LOUISIANA AMBIENT AIR MONITORING SITES

SUMMARY

	O_3	NO_X	SO_2	CO	PM_{10}	$PM_{2.5}$ (FRM)	$PM_{2.5}$ (TEOM)
TOTAL	23	12	5	1	2	17	9
NAMS	5	1	1	0	2	0	0
SLAMS	11	6	4	1	0	13	0
SPMS	7	5	0	0	0	4	9

NAMS - NATIONAL AIR MONITORING STATIONS

SLAMS - STATE AND LOCAL AIR MONITORING STATIONS

SPMS - SPECIAL PURPOSE MONITORING STATIONS

DUP - Site has duplicate sensors for this analyte.

*** - Site also monitors chemical speciation of particulate matter.**

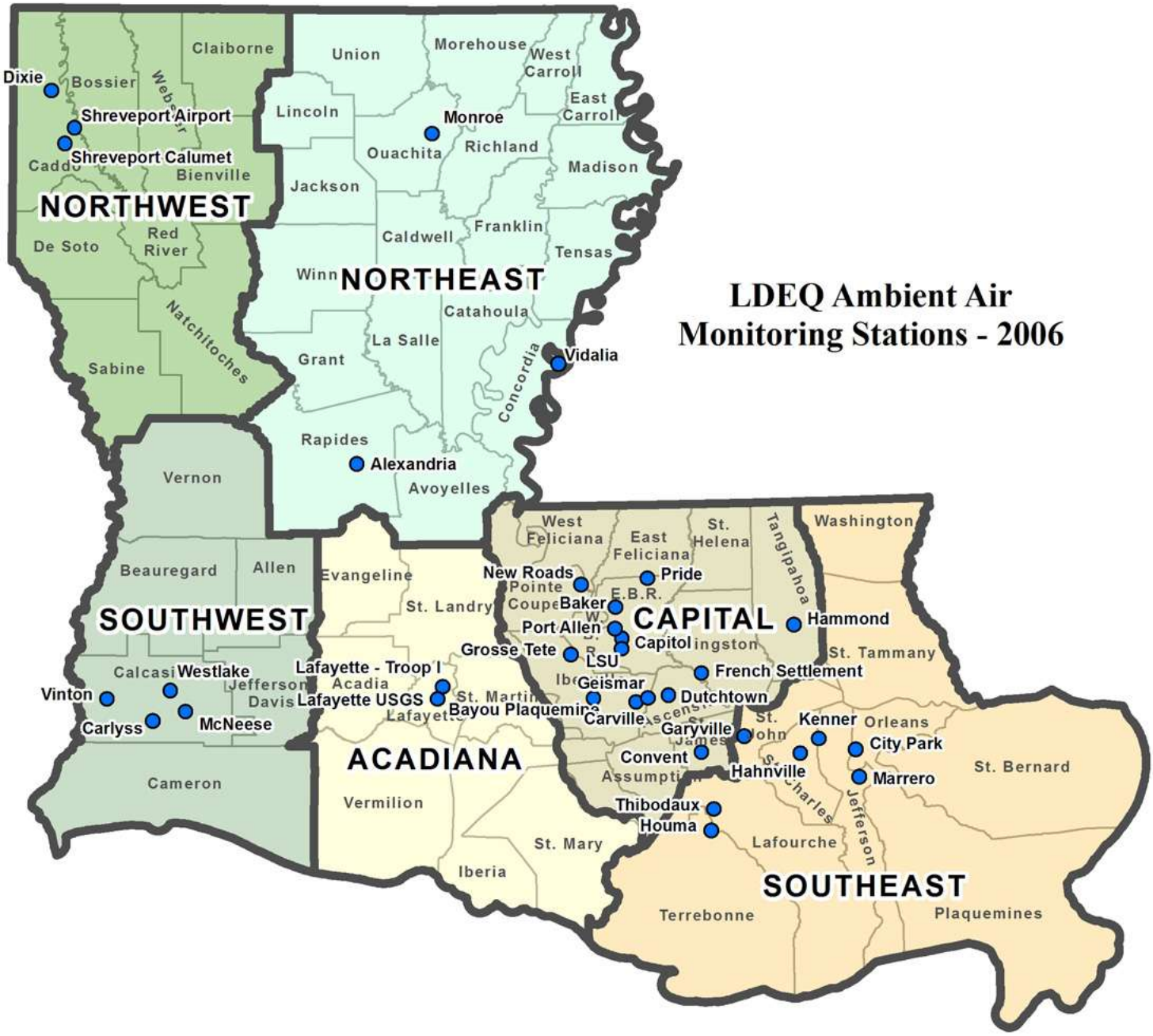


Figure 1. 2006 Louisiana Ambient Air Monitoring Sites

Pollutant Overview

Upon evaluation of Louisiana's NAMS/SLAMS network of the criteria pollutants currently being monitored, it is evident that ozone is of concern in the state. Currently only the five-parish Capital Region is in non-attainment of EPA's 8-hour ozone NAAQS. LDEQ operates and maintains 12 ozone monitors in this area and has been demonstrating that the data gathered is well representative of the overall air quality. LDEQ also monitors the remaining criteria pollutants, namely nitrogen dioxide, sulfur dioxide, carbon monoxide, PM_{10} and $PM_{2.5}$ at monitors appropriately located throughout the state. Figure 2 provides a view of the proximity of the monitors in the Capital Region.

Figure 2. Monitoring Sites in the Capital Region

Figure 3 shows statewide criteria pollutants concentrations as a percentage of the NAAQS for 2006. Only ozone values exceeded the NAAQS during 2006. Two sites had 8-hour design values over the NAAQS; LSU with a design value of 91ppb, and Baker with a design value of 87ppb. Carville and Port Allen both equaled the NAAQS with a design value of 85ppb.

The 24-hour max design values reached 89% of the standard in 2006, which was slightly lower than 2005 values. The highest value statewide (31.3μg/m^3) occurred at the Shreveport site. The highest three-year average design value was 13.6μg/m^3, which occurred at both Port Allen and Capitol sites. This value also remained below the NAAQS of 15μg/m^3.

Pollutants other than ozone and particulate matter remained considerably below the standard for 2006. For more detailed information please refer to each pollutant's individual section in the following pages.

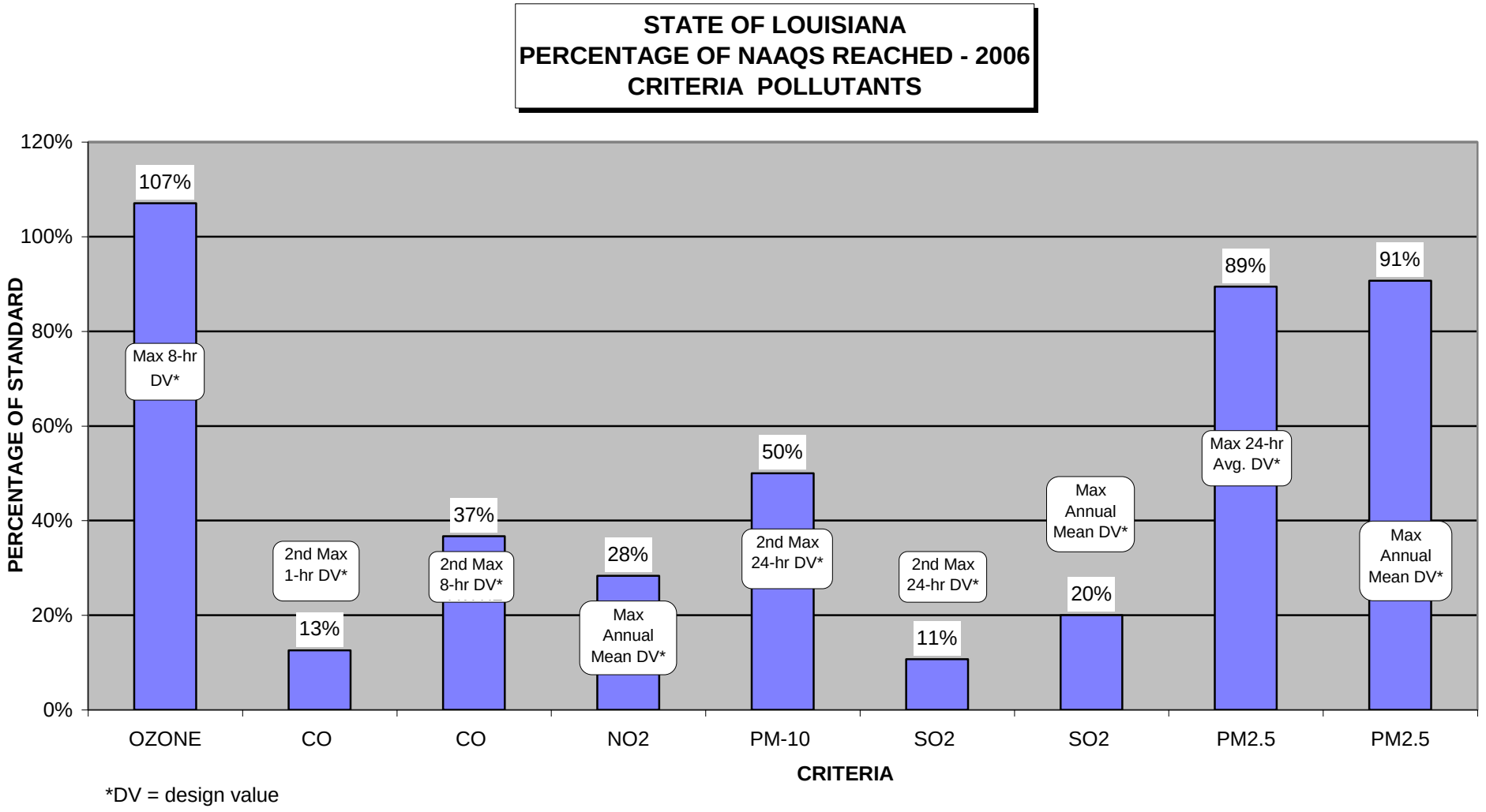


Figure 3. Percentage of Standards Reached

Ozone

Table 3. Louisiana Ozone Monitoring Stations		
Capital Region*	**Southeast Region**	**Southwest Region**
Carville	Kenner	Vinton
LSU	Hahnville	Carlyss
French Settlement	Thibodaux	Westlake
Grosse Tete	Garyville	
Dutchtown		
Capitol	**Acadian Region**	**North Region**
Bayou Plaquemine	Lafayette-USGS	Shreveport Airport
Baker		Dixie
Pride		Monroe
Port Allen		
New Roads		
Convent		

***See Figure 1 for the definitions of the regions and the cities they include**

Ozone is the criteria pollutant of most concern in Louisiana. It is formed when pollutants such as Nitrogen Dioxide (NO_2) and Volatile Organic Carbon (VOC) are emitted and chemically react in the presence of sunlight. Ozone irritates the respiratory system and may adversely affect people with asthma and lung diseases. EPA expressed concern over the effect of long-term ozone exposure and replaced the 1-hour standard with the more restrictive 8-hour standard. The ozone 8-hour standard became effective June 15, 2004. As of June 15, 2005 the 1-hour standard was revoked nation-wide.

Ozone is currently being monitored at 23 sites throughout Louisiana. Most of these monitors are located in the Capital Region since it is the only region in the state in non-attainment of the ozone 8-hour standard. It has been designated as marginal. This area covers the parishes of Ascension, East Baton Rouge, Iberville, Livingston, and West Baton Rouge. Table 3 lists where these monitors are located.

The number of days the ozone concentration was above the NAAQS for each of the sites in the monitoring network can be found in Figure 4. Figures 5 through 9 show the 8-hour NAAQS exceedances for each region. The area's highest 8-hour design value was 91ppb at LSU.

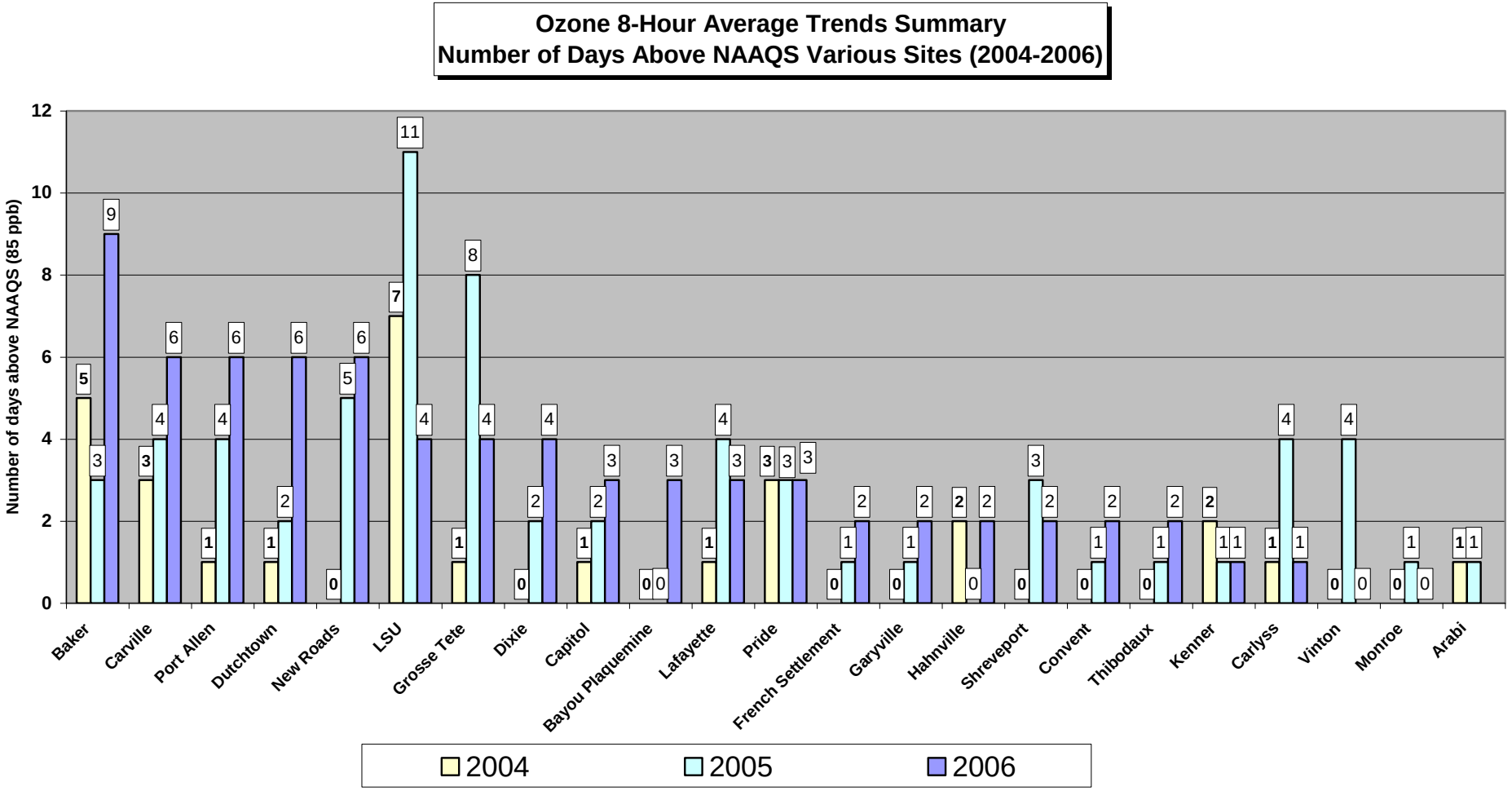


Figure 4. Ozone 8-Hour Average Trends Summary

8-hr Exceedances and Design Values for the 5-Parish Capital Region (2004-2006)

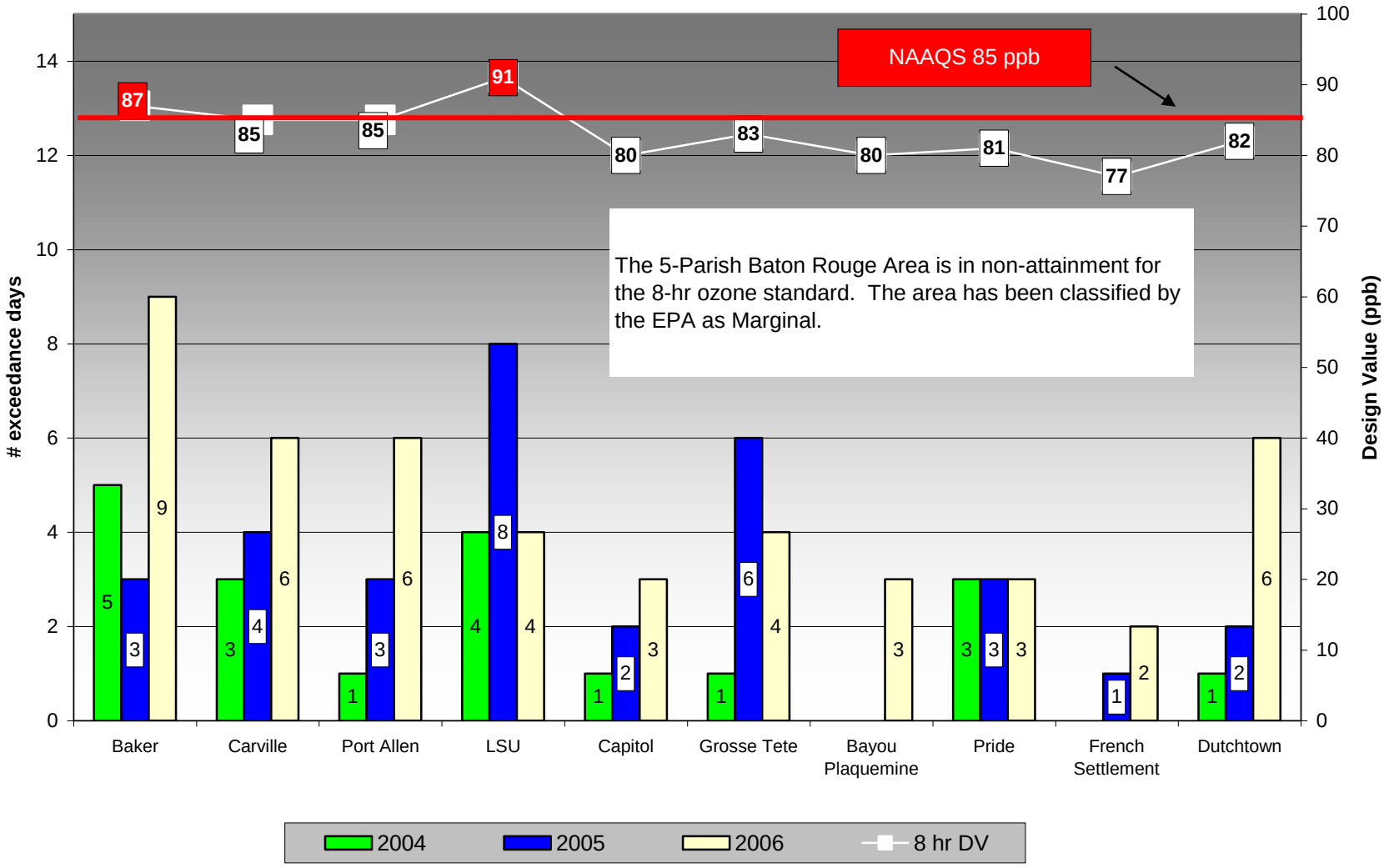


Figure 5. 8-Hour Exceedances and Design Value for Capital Region

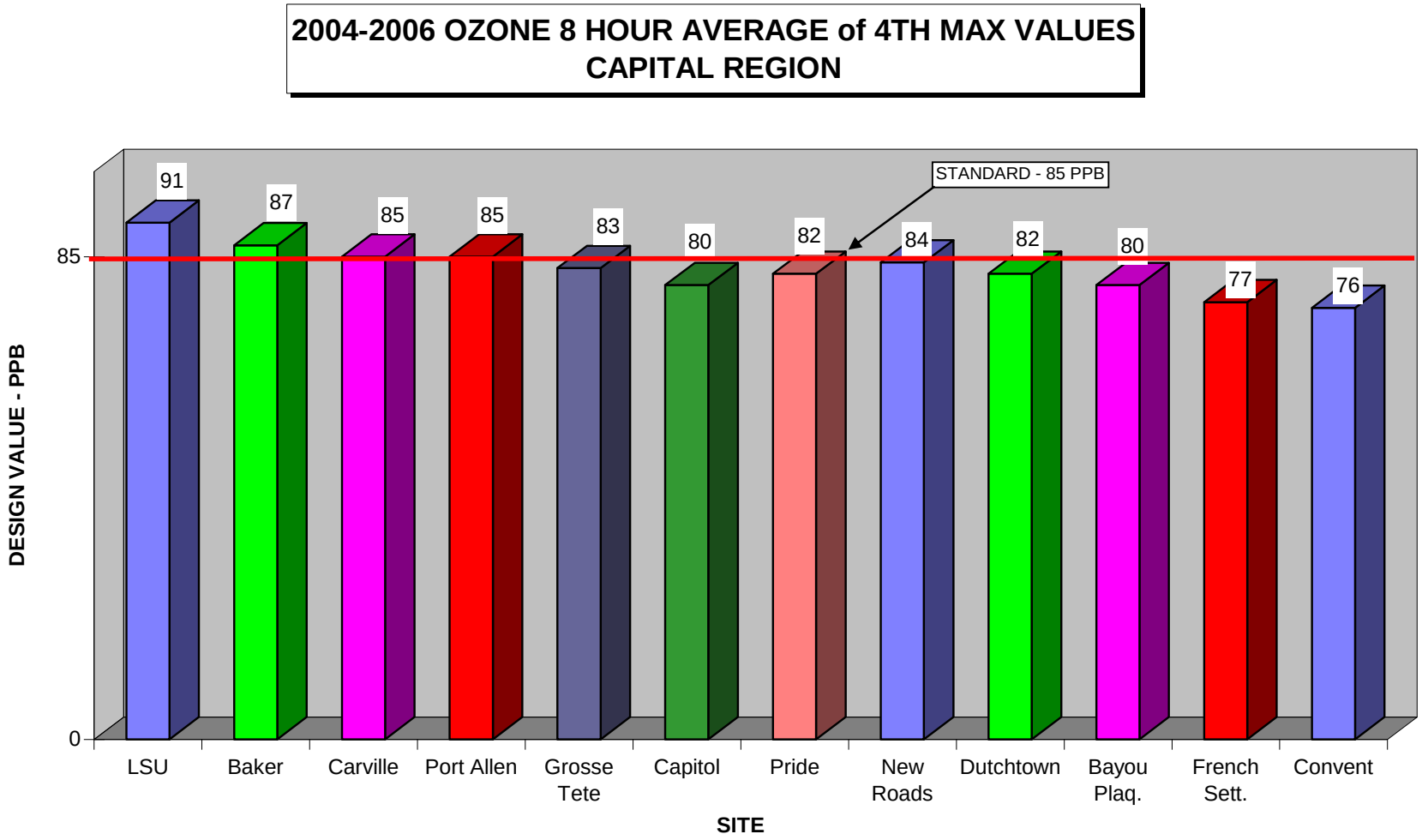


Figure 6. 2004-2006 8-Hour Average of 4th Max -Capital Region

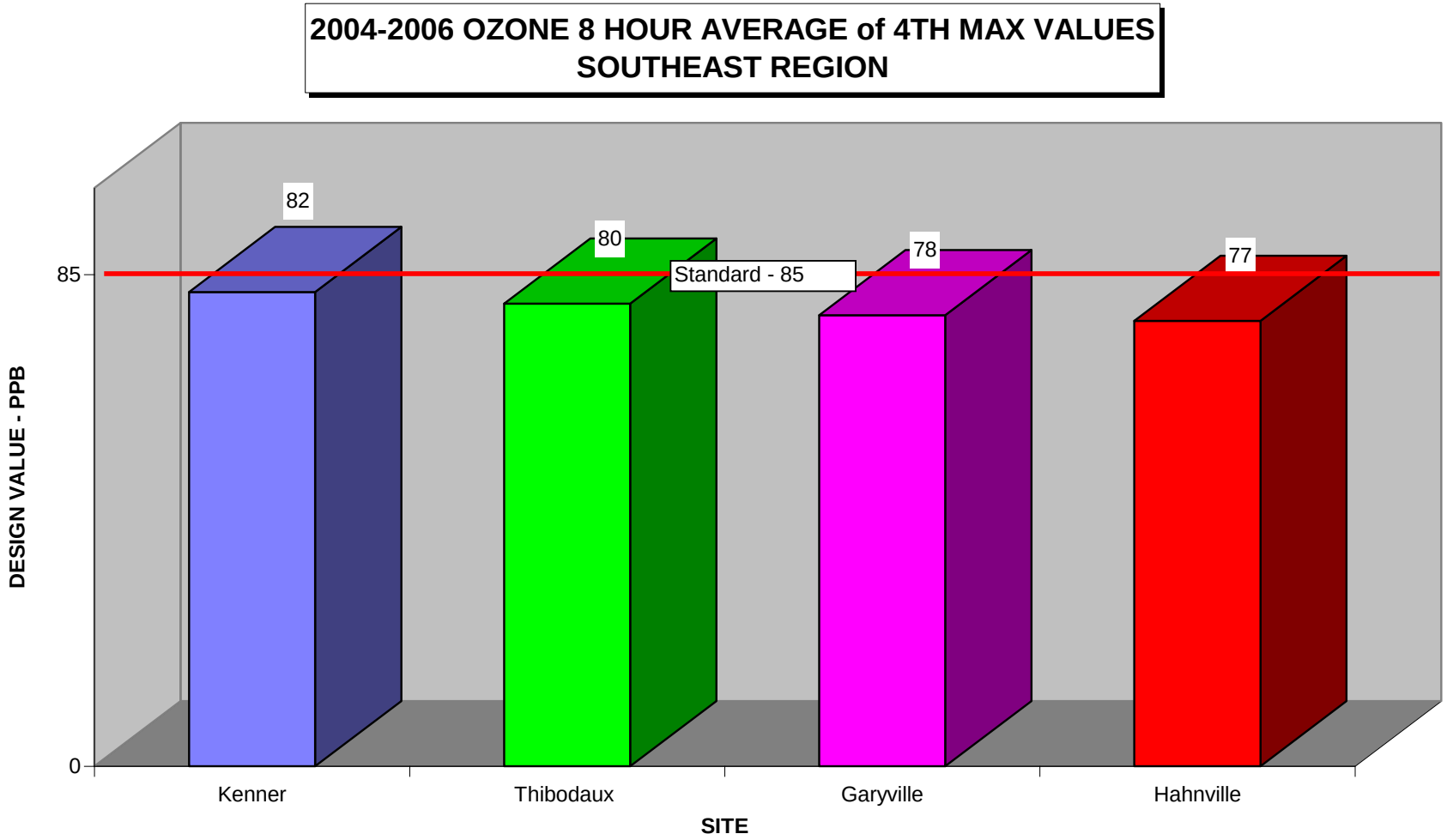


Figure 7. 2004-2006 8-Hour Average of 4th Max- Southeast Region

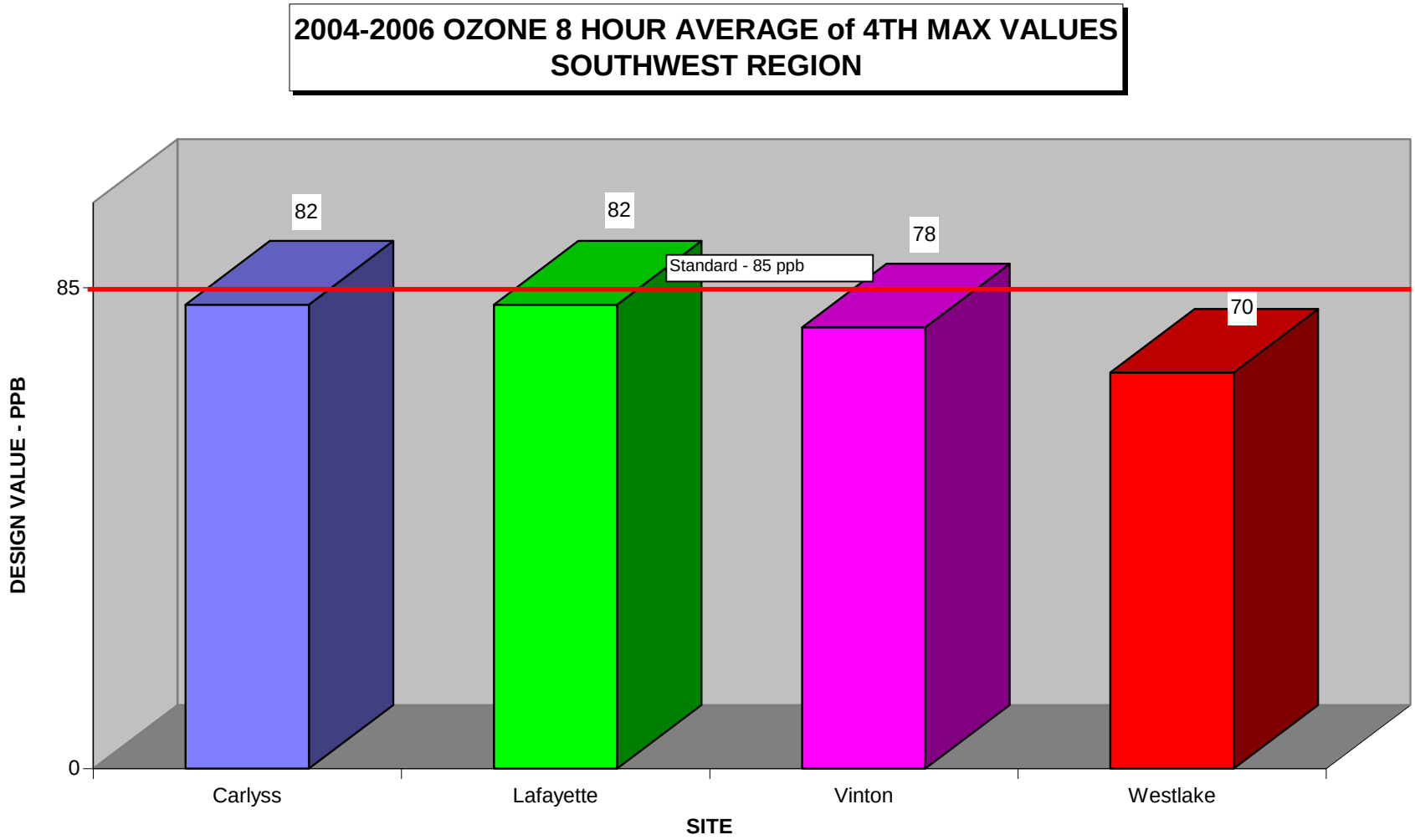


Figure 8. 2004-2006 Ozone 8-Hour Average of 4th Max - Southwest Region

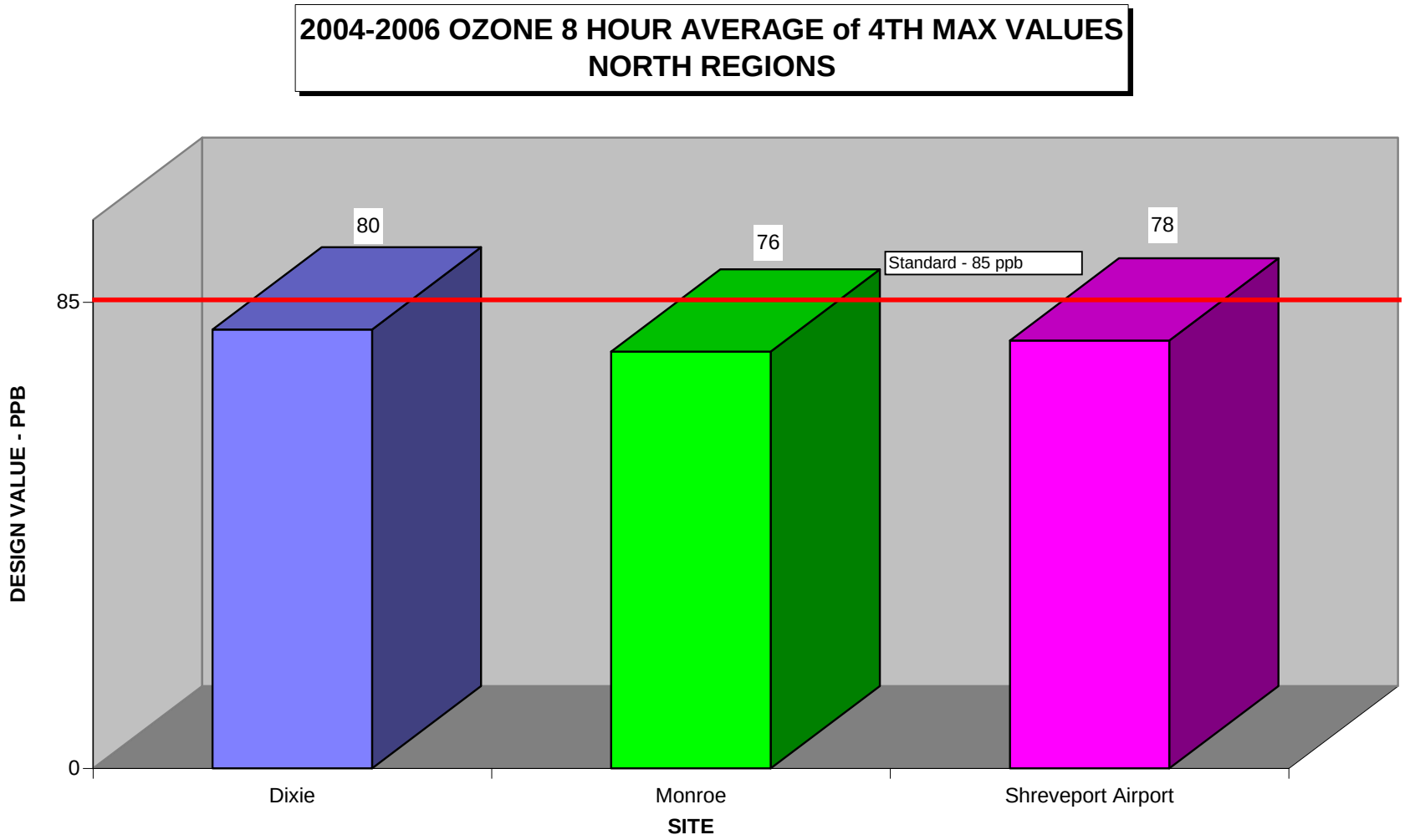


Figure 9. 2004-2006 Ozone 8-Hour Average of 4th Max - North Regions

Nitrogen Dioxide

Table 4. Louisiana Nitrogen Dioxide Monitoring Stations	
Capital Region Bayou Plaquemine Baker Capitol Carville Dutchtown French Settlement LSU Grosse Tete Port Allen Pride	**Southeast Region** Kenner **Southwest Region** Westlake

NO_2 is a prime precursor reactant for ozone. NO_2 reacts with VOC in the presence of sunlight to form photochemical oxidants. Nitrogen oxides are formed when fuels (natural and man-made) are burned. In order to make the best observations of concentrations of this pollutant, monitors are needed in areas with large mobile and stationary sources.

Data collected by the LDEQ in 2006 indicated that in general, NO_2 concentrations remained relatively low in comparison to the standard. The highest annual mean, recorded at Capitol site, was only 28% of the standard of 53ppb in 2006. Figure 10 is a graph of the annual means values for each of the 12 monitoring locations listed in Table 4. 10 of these sites are located in the petroleum industry-rich corridor of Baton Rouge, one monitor is in the reestablishing populous of New Orleans and one monitor is located in Westlake.

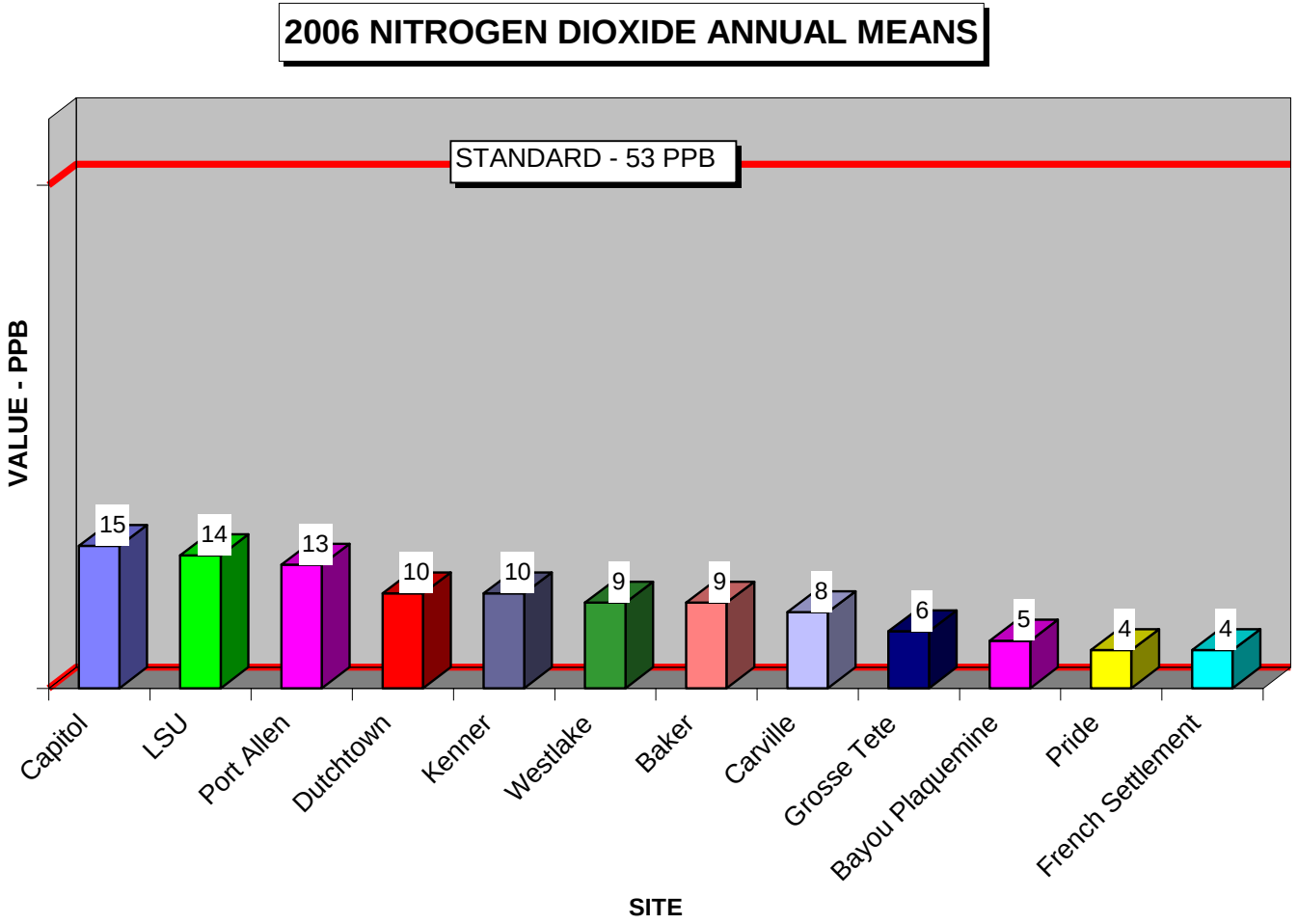


Figure 10. 2006 Nitrogen Dioxide Annual Means

Sulfur Dioxide

Table 5. Louisiana Sulfur Dioxide Monitoring Stations		
Capital Region Capitol Port Allen	**Southwest Region** Westlake	**North Region** Shreveport Airport Monroe

The burning of sulfur or any material containing sulfur produces sulfur dioxide (SO_2). The largest source of SO_2 is fossil-fuel combustion from electric power generation. SO_2 can form acids when they hydrolyze with water, and the acids can then have detrimental effects on the environment in the form of acid rain. In addition, SO_2 has been associated with human health problems, damage to plants and animals, smog and haze through the formation of acid mists, and corrosion of metals.

Sulfur dioxide sampling in Louisiana over the past years has indicated that the levels of SO_2 are insignificant when compared with the standard. The highest annual mean during the year 2006 was found at the Port Allen site with a value of 6 ppb (only 20% of the 30ppb NAAQS), which as decreased since last year. Figure 12 through 14 give the annual mean, 24-hour max, and historical statewide max values for the SO_2 monitoring network.

There were five SO_2 monitoring sites in Louisiana in 2006. These have been stationed primarily in areas of high population or near potential SO_2 sources. Regardless of their proximity to mobile or point sources, the minimal concentrations of SO_2 make this pollutant a virtual non-concern to Louisiana.

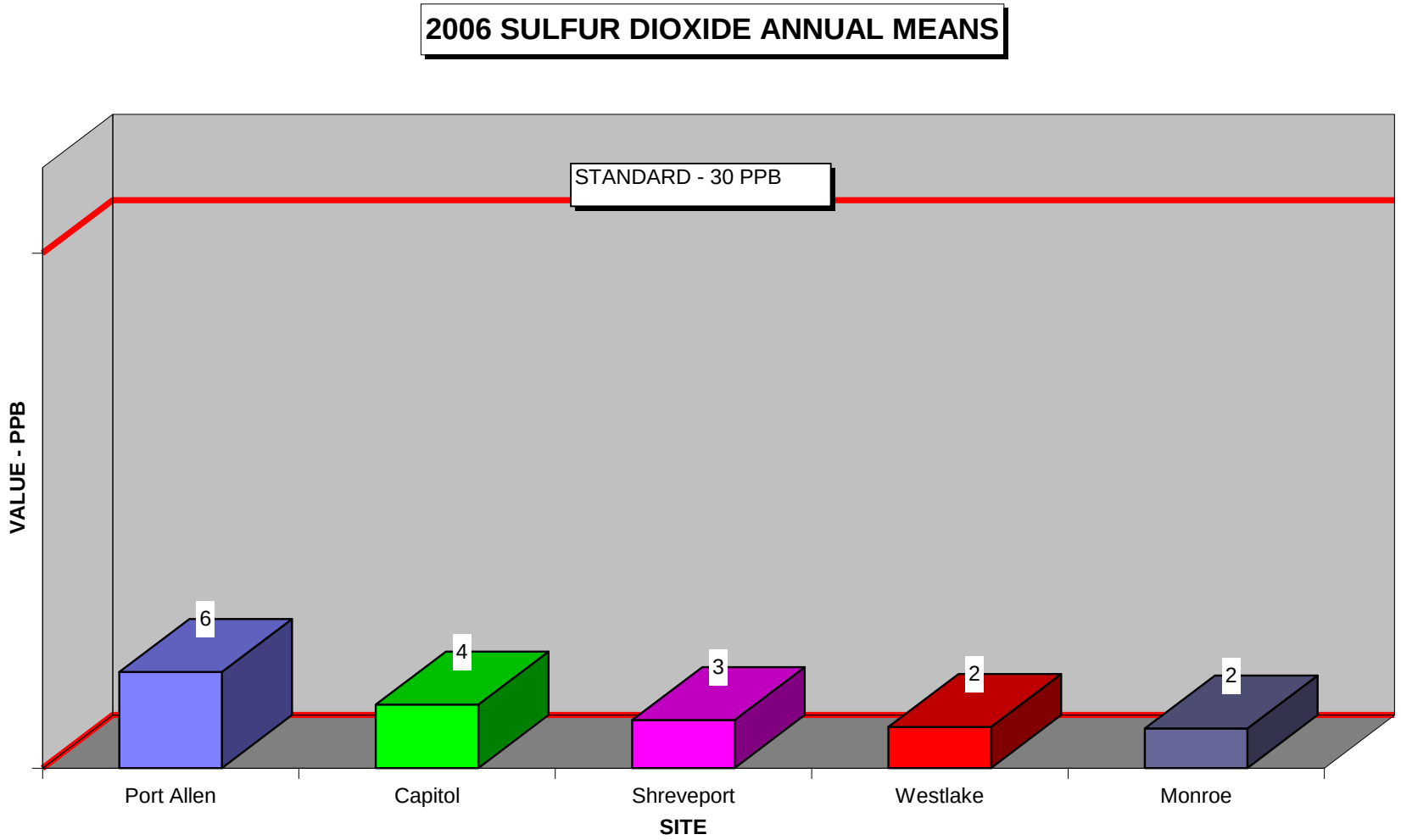
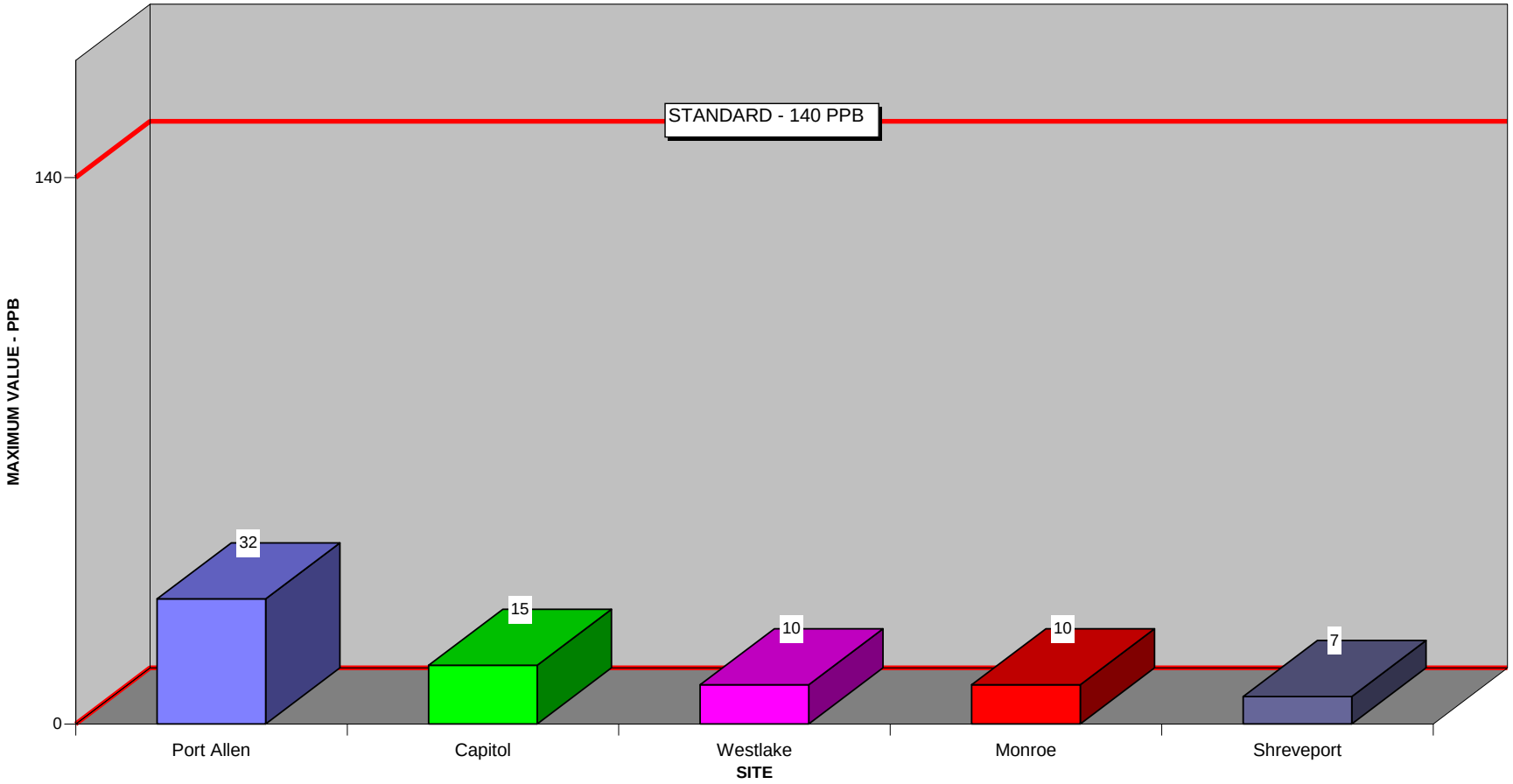


Figure 11. 2006 Sulfur Dioxide Annual Means

2006 MAXIMUM SULFUR DIOXIDE 24-HR VALUES



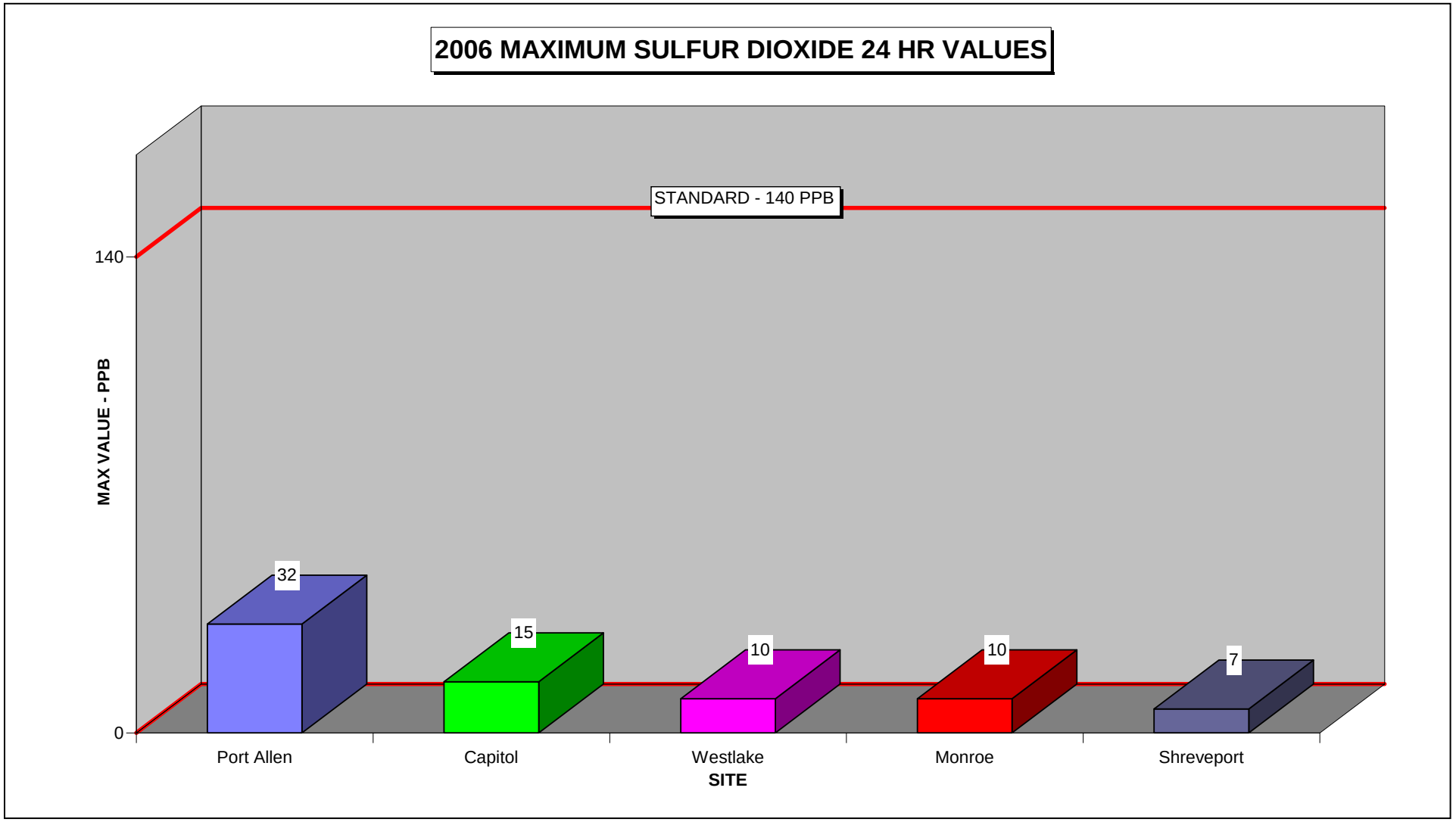


Figure 12. 2006 Maximum Sulfur Dioxide 24-Hour Values

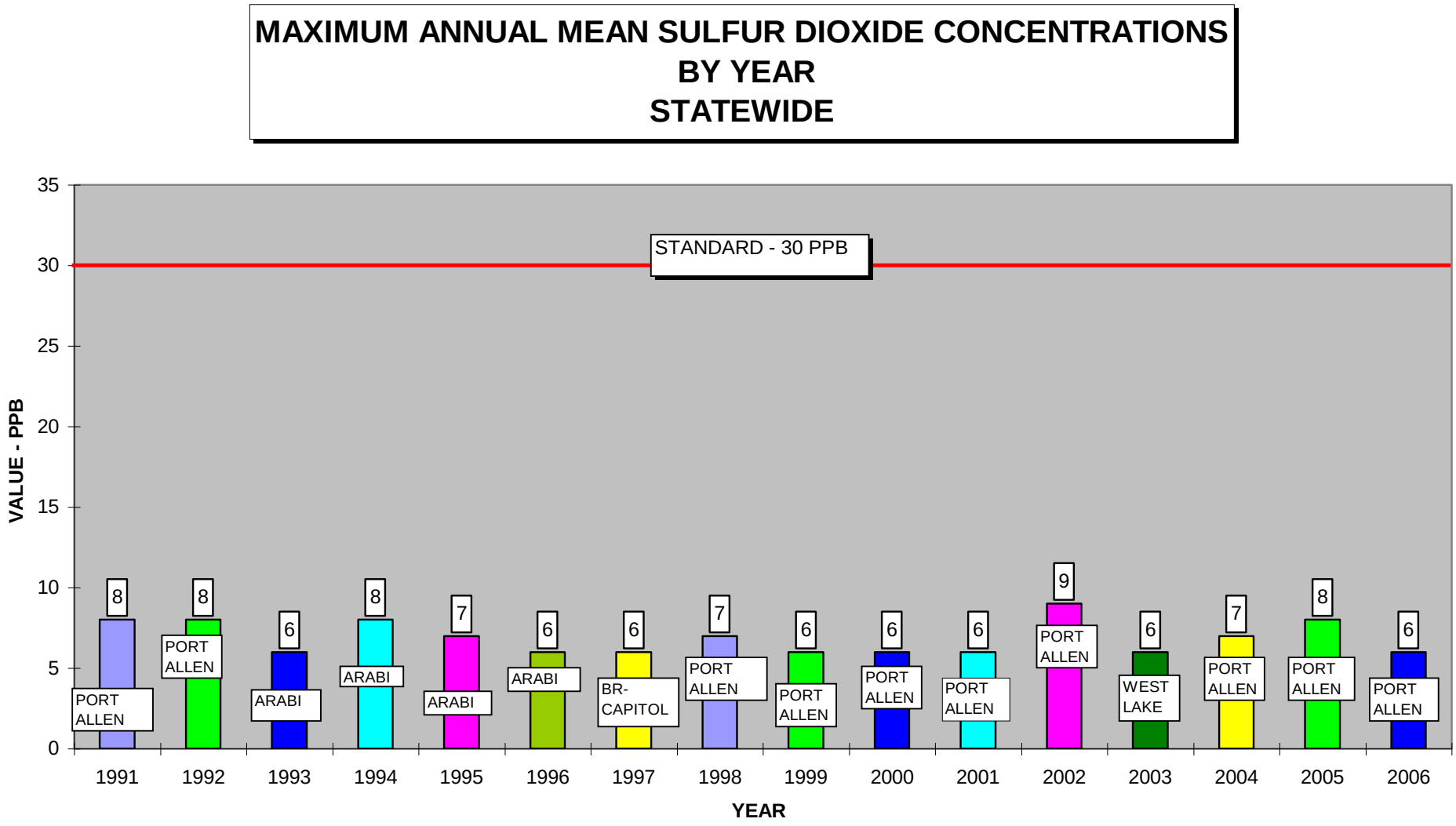


Figure 13. Maximum Annual Mean Sulfur Dioxide Concentrations by Year Statewide

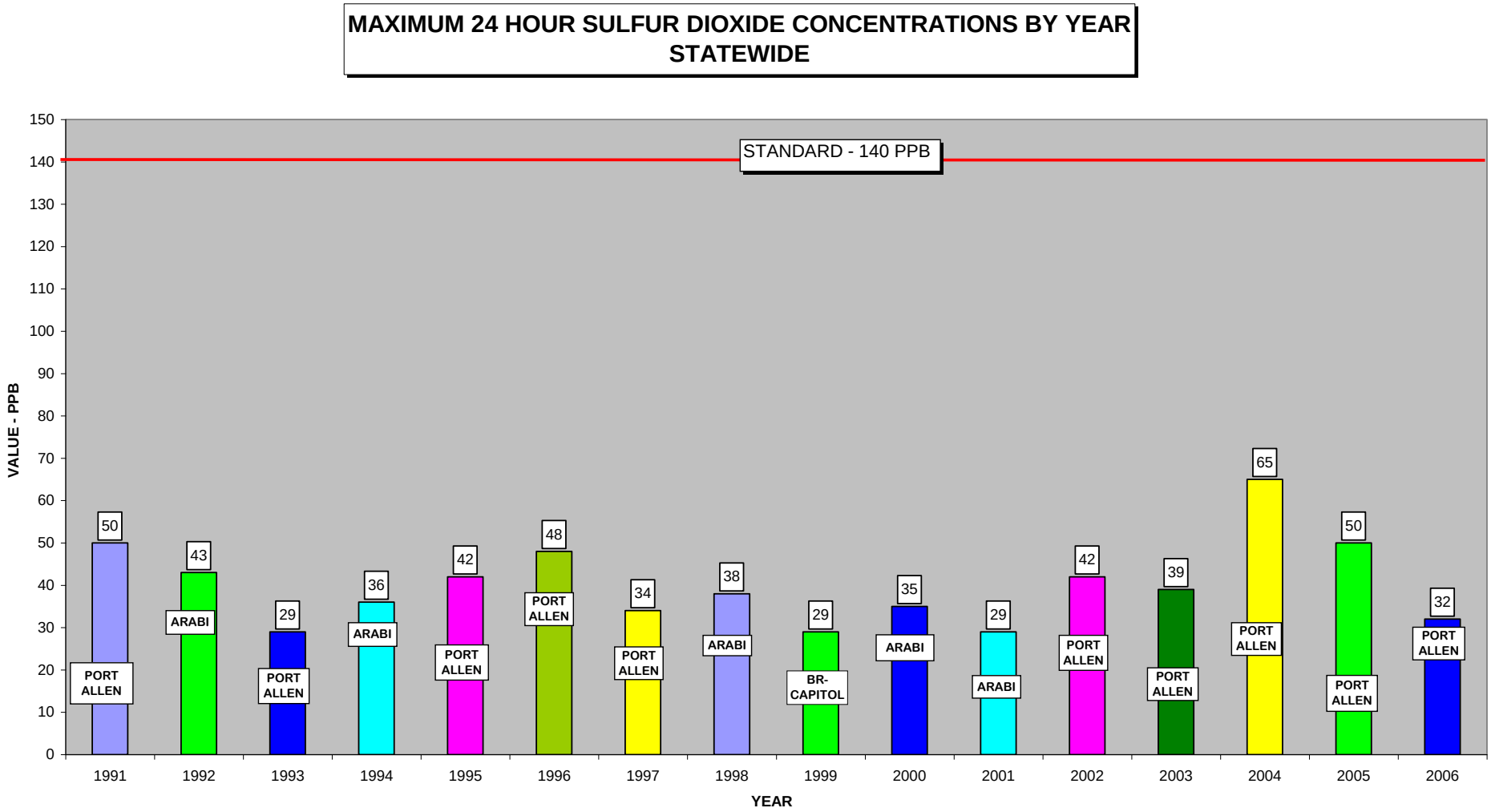


Figure 14. Maximum 24-Hour Sulfur Dioxide Concentrations by Year Statewide

Carbon Monoxide

Table 6. Louisiana Carbon Monoxide Monitoring Stations
Capital Region Capitol

Carbon monoxide (CO) is a colorless, odorless, tasteless gas that is caused by the incomplete combustion of any carbonaceous fuel. The main source of this pollutant is the transportation sector. The effects on humans range from slight headaches to nausea to death depending on the level of concentration and time of exposure.

The Capitol monitor in Baton Rouge constitutes the entire CO monitoring network. This location is the state's most populated city after the storm. The Capital site is located in the heart of the city, less that half a mile from a heavily traveled section of Interstate 110. LDEQ believes that carbon monoxide monitor placement within the state is adequate as indicated by the monitored values.

Louisiana has maintained CO levels below the NAAQS. The second maximum 2006 1-hour CO concentration was 13% of the standard, and the second maximum 8-hour CO concentration was 37% of the standard both of which occurred at the Capitol site.

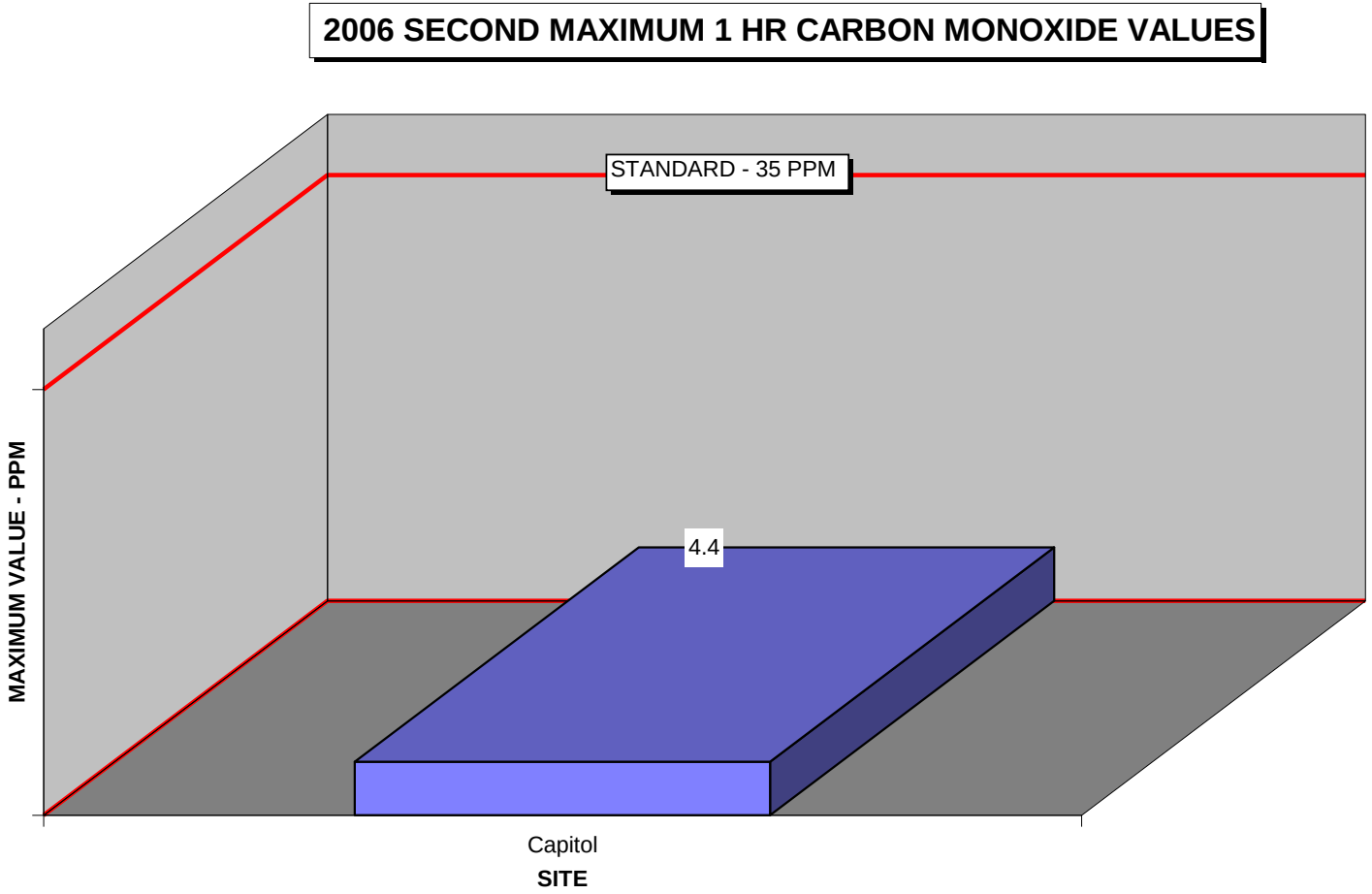


Figure 15. 2006 Second Maximum 1-Hour Carbon Monoxide Values

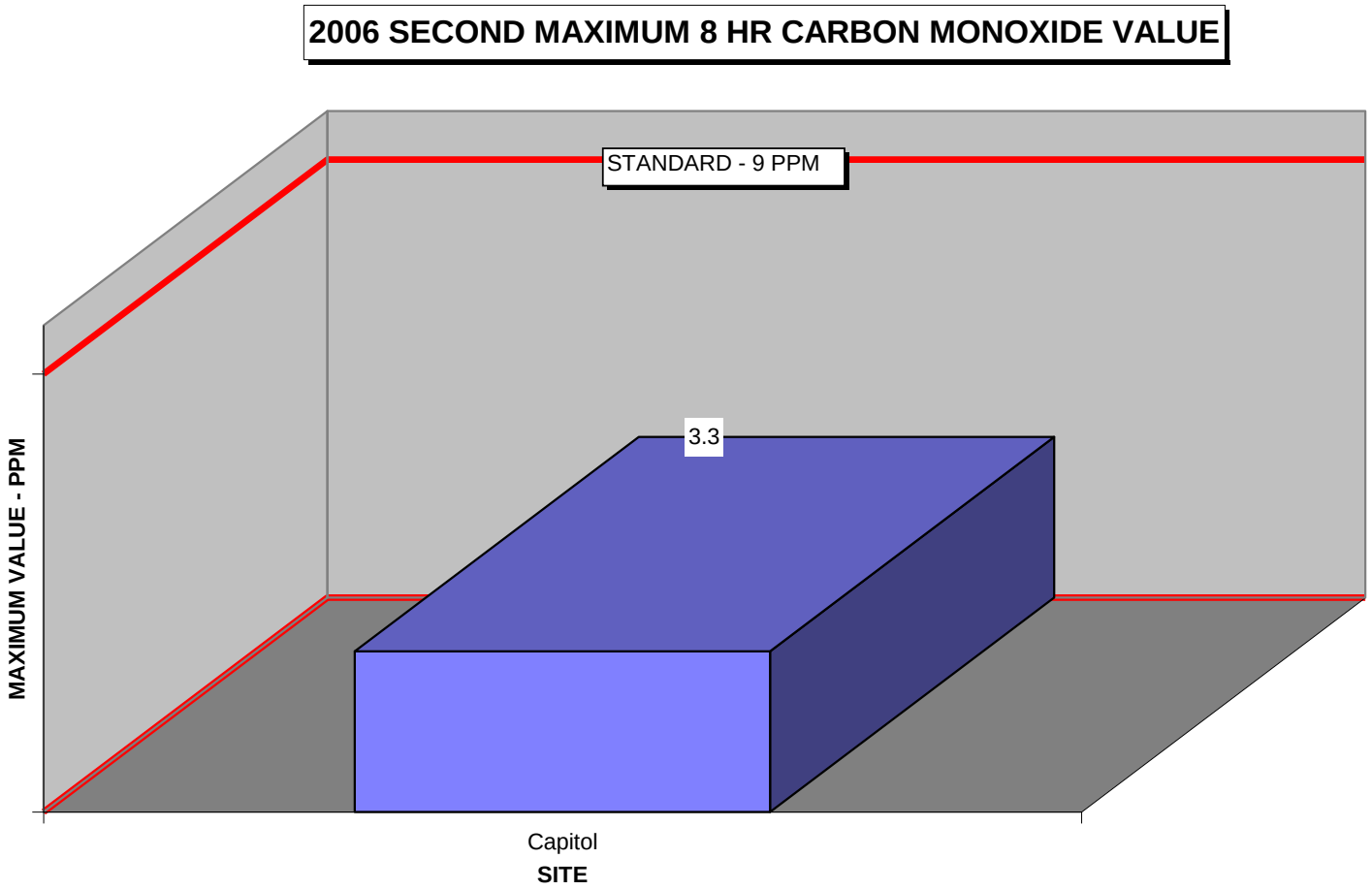


Figure 16. 2006 Second Maximum 8-Hour Carbon Monoxide Values

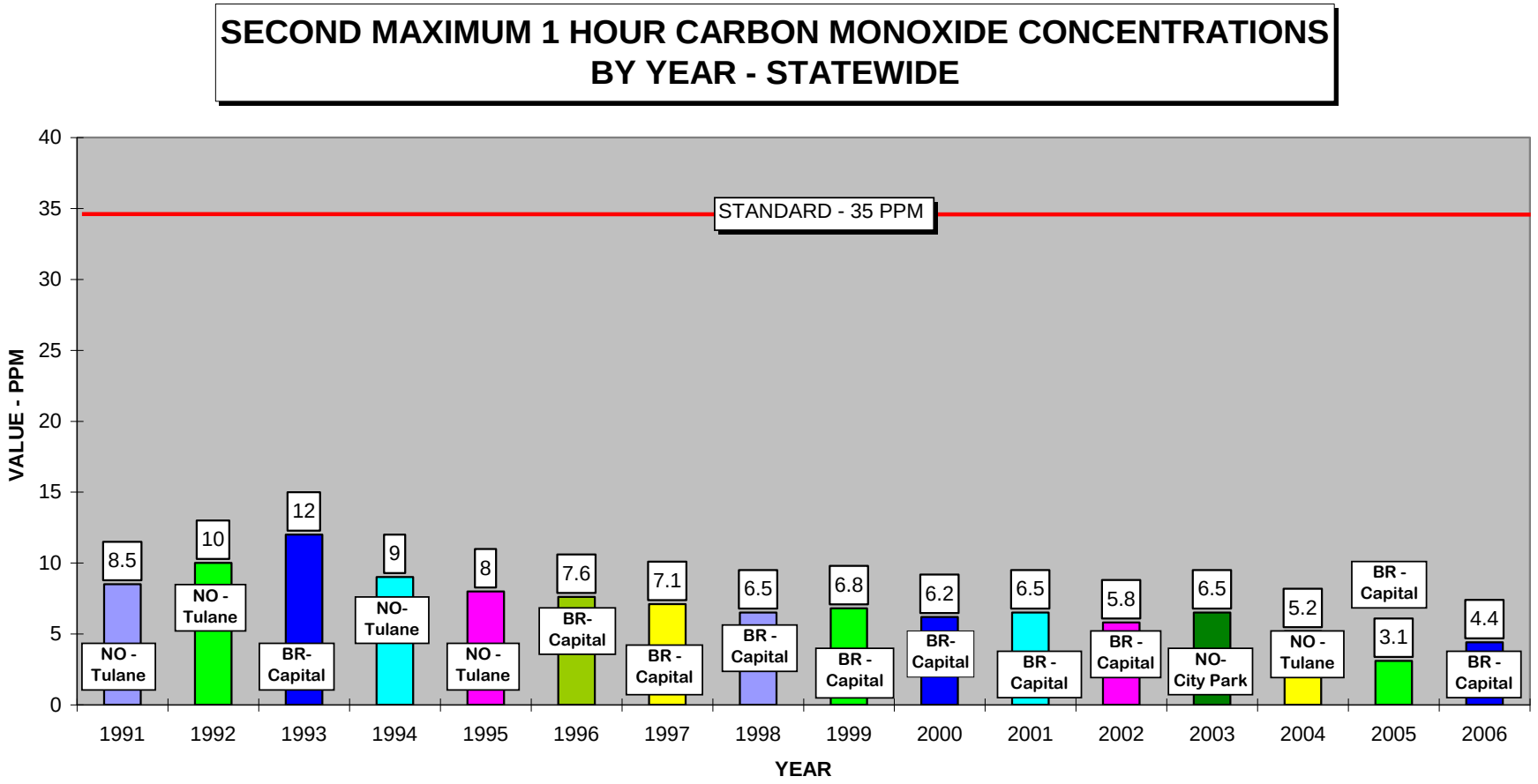


Figure 17. Second Maximum 1-Hour Carbon Monoxide Concentrations by Year Statewide

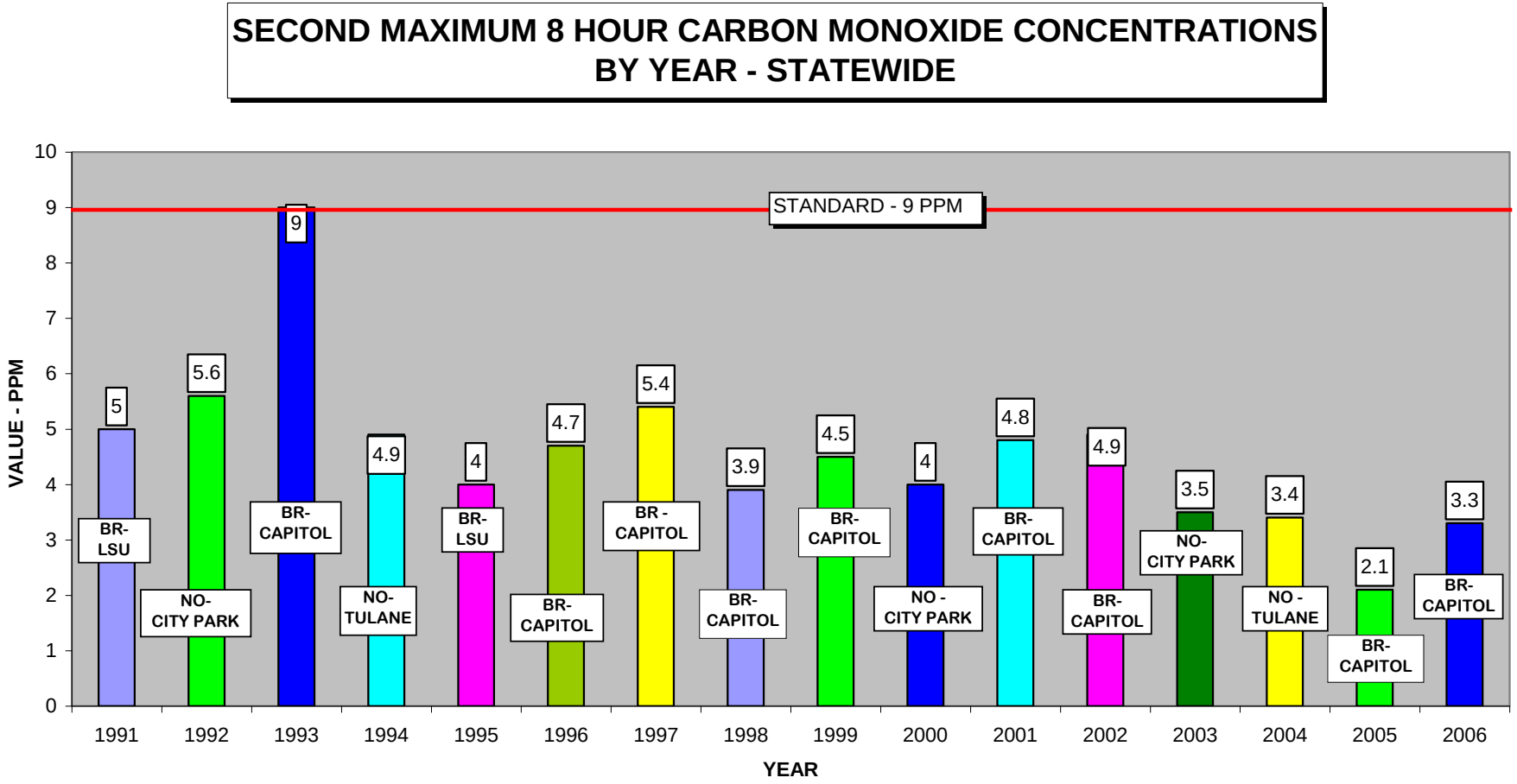


Figure 18. Second Maximum 8-Hour Carbon Monoxide Concentrations by Year Statewide

Particulate Matter (PM_{10} and $PM_{2.5}$)

Particulate matter or particulates are very-small-diameter solids or liquids that remain suspended in gases and can be discharged into the atmosphere. Louisiana currently monitors for two different types of particulates, PM_{10} and $PM_{2.5}$. PM_{10} is particulate matter of 10 microns in diameter or smaller, while $PM_{2.5}$ (or PM-fine) particles are approximately 2.5 microns or smaller. Industrial particulates are produced by many processes including crushing and grinding ores, loading dry materials in bulk, combustion processes, and from gas conversion reactions in the atmosphere. Particulates can also be produced by natural events such as forest fires. There are many different sources of these particulates and the sampling must be in-depth and widespread to ensure good coverage and accurate results.

PM_{10}

Table 7. Louisiana PM_{10} Monitoring Stations

Capital Region	**North Region**
Port Allen	Shreveport Calumet

In 2006 City Park; Water Plant and Lulling (all PM_{10} samplers in the Southeast Region) were shut down. Table 7 shows the two remaining Louisiana PM_{10} monitoring stations. They monitor particulate year round. As seen in Figures 20 through 23, the highest 24-hour PM_{10} reading in 2006 was 85$\mu g/m^3$ (Port Allen site) compared to the standard 150$\mu g/m^3$. The highest annual mean was 39$\mu g/m^3$ at Port Allen, compared to the 50$\mu g/m^3$ standard.

$PM_{2.5}$

Table 8. Louisiana $PM_{2.5}$ Monitoring Stations		
Capital Region*	**Southeast Region**	**Southwest Region**
Baker	City Park	Lake Charles-McNeese
Bayou Plaquemine	Houma	Vinton
Capitol	Kenner	Westlake
French Settlement	Marrero	
Geismar	Thibodaux	
Hammond		
Port Allen	**Northeast Region**	**North Region**
Pride	Alexandria	Monroe
	Vidalia	Shreveport Airport
		Shreveport Calumet
	Acadiana Region	
	Lafayette	
	Lafayette USGS	

The EPA implemented the $PM_{2.5}$ program in January of 1999. A total of 25 sampling sites are established throughout the state. Seventeen sites are furnished with Federal Reference Method (FRM) monitors – Rupprecht & Patashnick (R&P) model 2025 sequential air samplers. Three of these sites have collocated FRM monitors. Nine sites have continuous sampling monitors (R&P TEOM® model 1400 AB). All $PM_{2.5}$ monitoring stations locations are given in Table 8. The type of monitor located at each station can be determined from Table 2.

It should be noted that TEOM® monitors are not approved for use in Federal Reference Methods. Therefore, the readings obtained from these monitors are compared to FRM monitors and are used as indicator values only. The values may not be directly compared to the NAAQS for particulate matter.

The $PM_{2.5}$ monitoring information is summarized in Figures 23 to 28 for 2006. The highest three year annual mean for $PM_{2.5}$ was 13.6$\mu g/m^3$ recorded at both the Port

Allen site and Capitol site. No 24-hour value was above the 35μg/m^3 standard. The highest 24-hour reading in the state was recorded at the Shreveport site at 31.3μg/m^3. No samplers in the state indicated an annual mean above 15μg/m^3 for the year 2006. All FRM sites showed a cyclical trend in concentrations during the past three years. This trend was also seen in data obtained from continuous (TEOM®) samplers, which have been in operation for only the past seven years.

As seen in Figure 28, three sites have both FRM and TEOM® samplers collocated at one site. The annual mean of the TEOM® for each of these sites obtains 7% to 11% lower values compared with the FRM samplers respectively. Port Allen is the site with the highest $PM_{2.5}$ concentrations with collocated monitors for three years running. This allows a comparison of the three-year average annual mean of collocated TEOM® and FRM monitors. Comparing Figures 24 and 26, one can see that the three-year average annual mean for 2004-2006 for the TEOM® sampler was 13.0μg/m^3, whereas the FRM sampler for this site read 13.6μg/m^3 for the same time period.

Chemical Speciation

Speciation monitors, URG 400 and URG 450, are in operation at the Capitol site in Baton Rouge and at the Shreveport airport site. These standards are also obtained for information purposes only. There is no standard for chemical constituents of particulates. 2006 monitoring results shown in Figures 29 and 30 indicate that the majority of the mass collected was composed of the following compounds:

- Sulfur compounds (28% of the total weight at Capitol and 24% of the total weight at Shreveport);
- Organic carbon followed at 25% of the total weight at the Capitol site and 30% of the total weight at the Shreveport airport site.

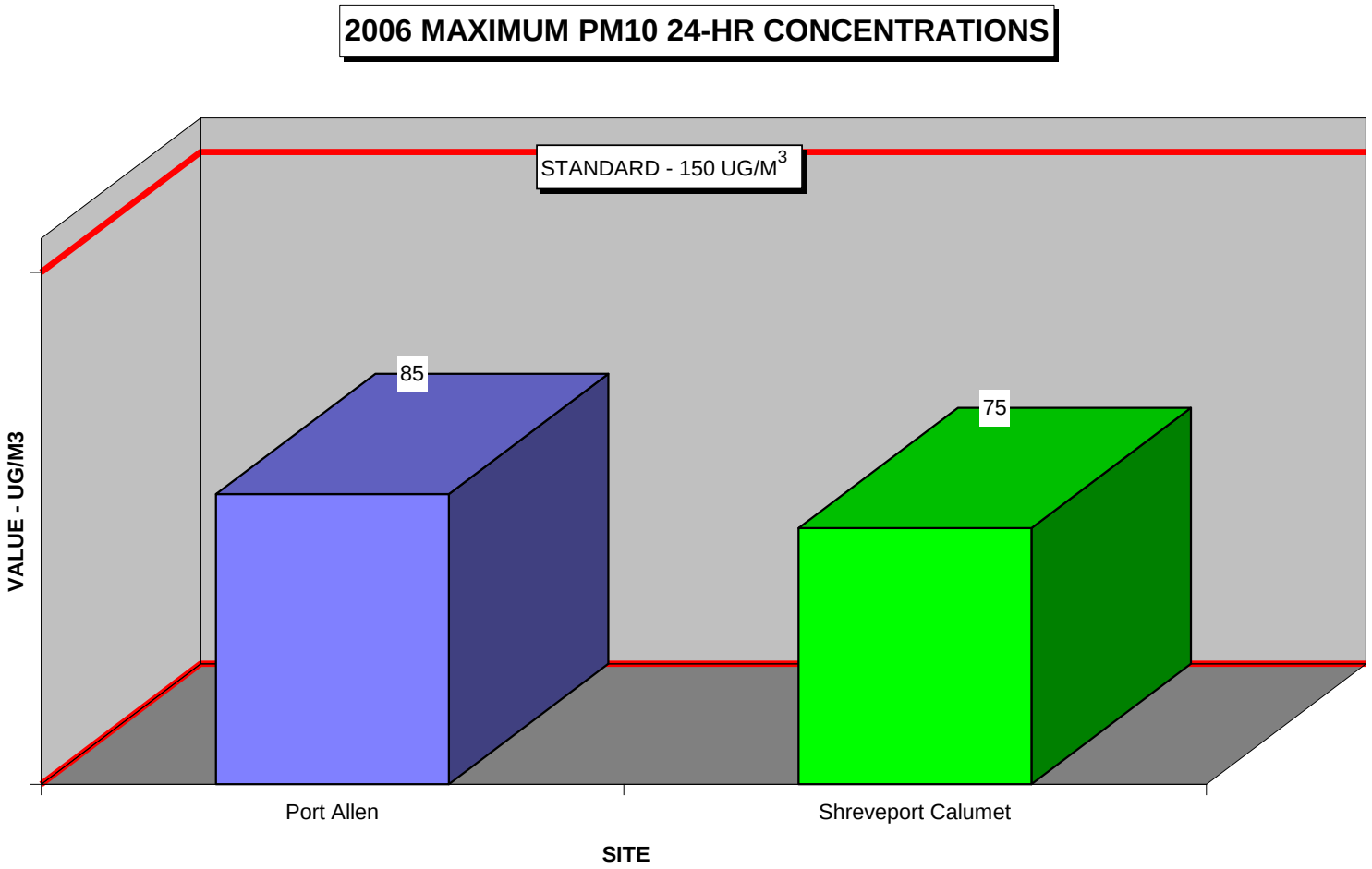


Figure 19. 2006 Maximum PM_{10} 24-Hour Concentrations

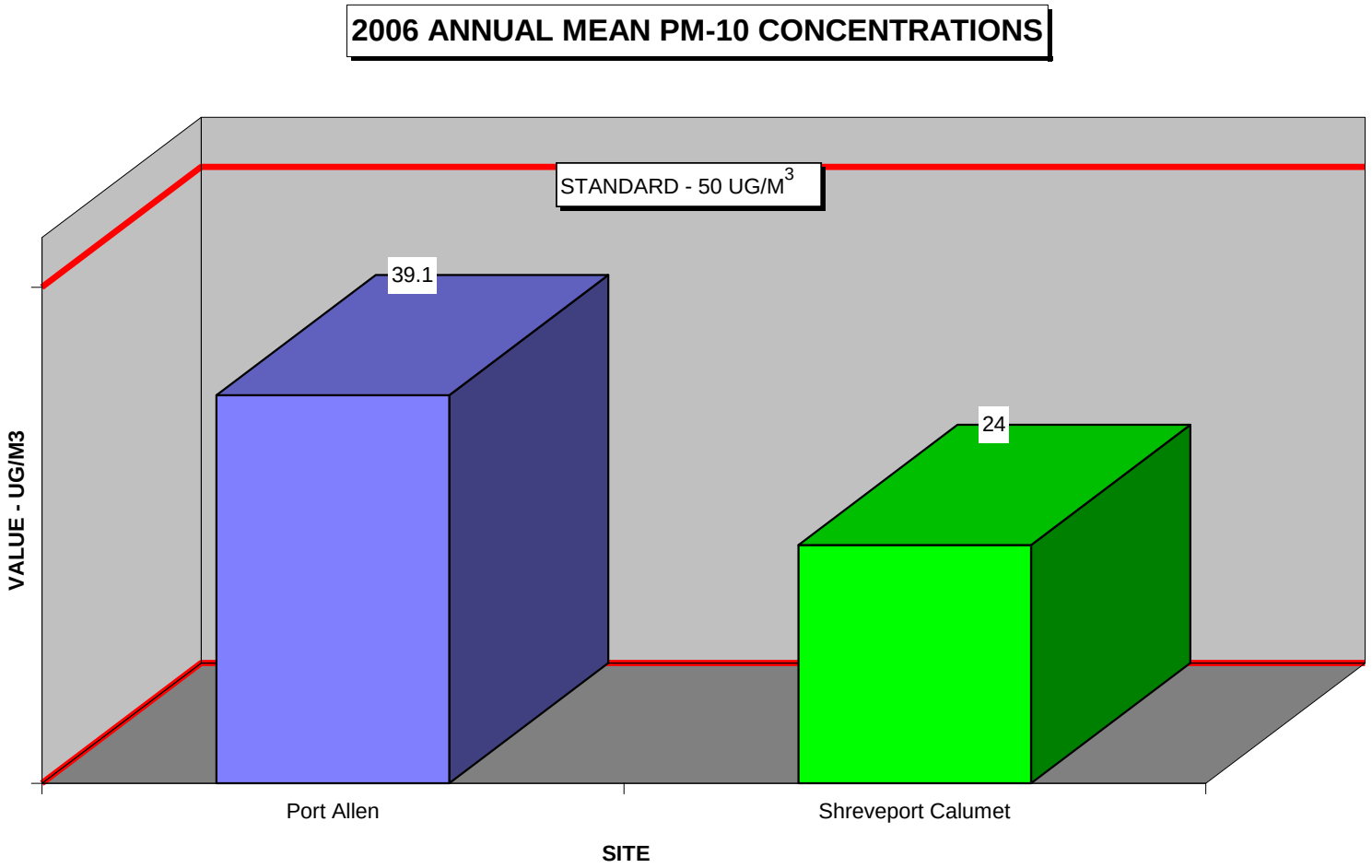


Figure 20. 2006 Annual PM_{10} Concentrations

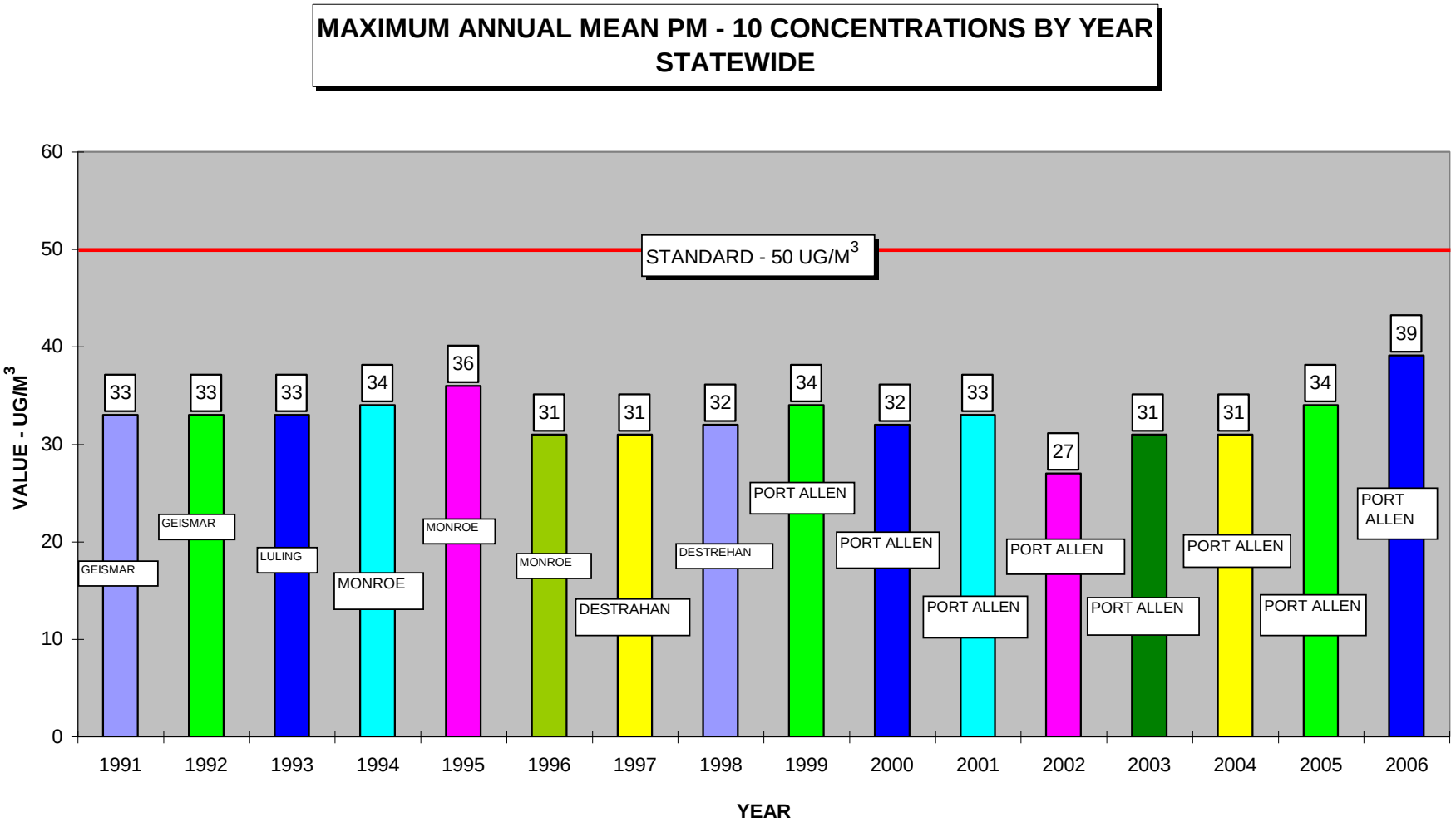


Figure 21. Maximum Annual Mean PM_{10} Concentrations by Year

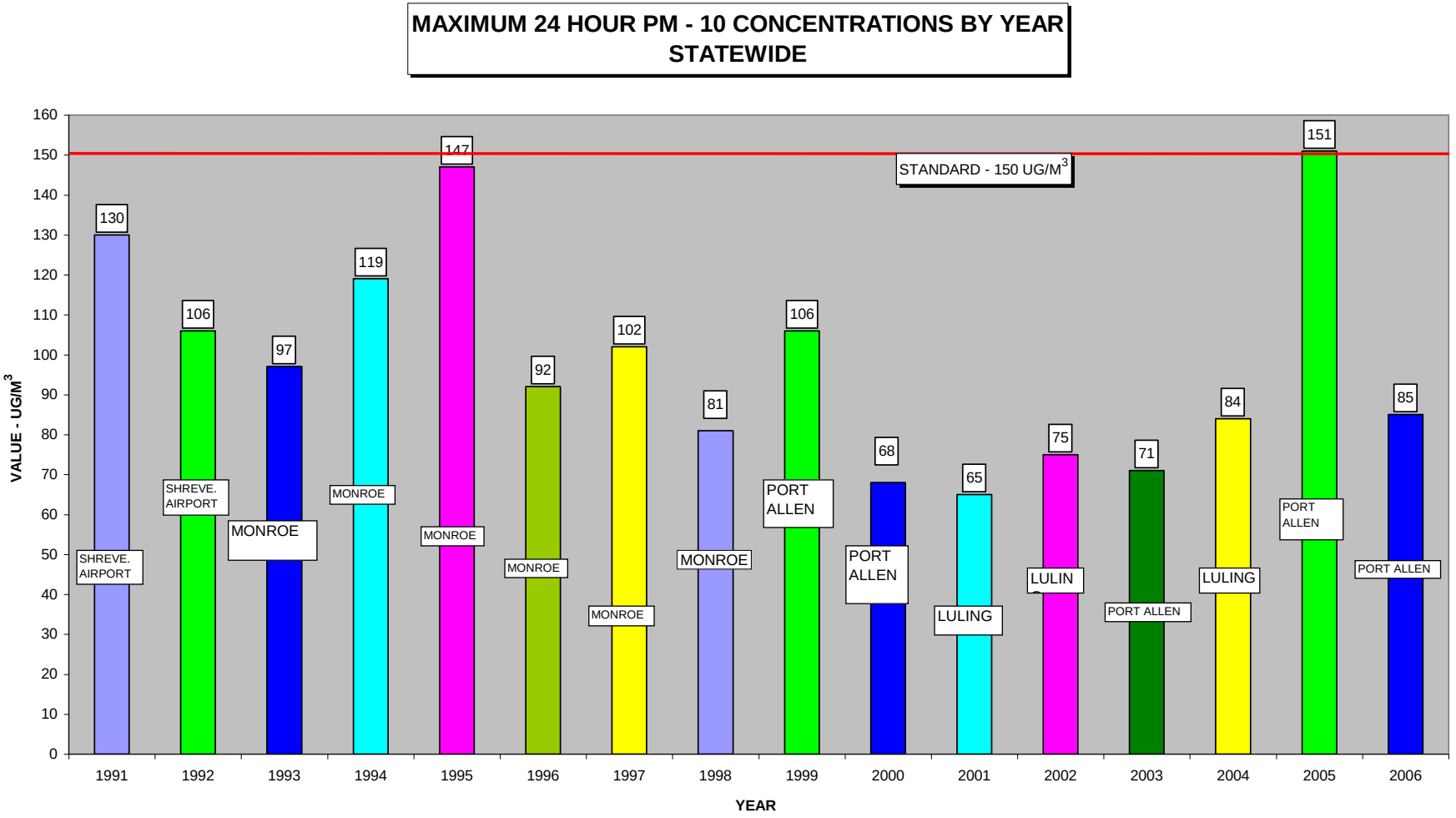


Figure 22. Maximum 24-Hour PM_{10} Concentrations by Year Statewide (1991-2006)

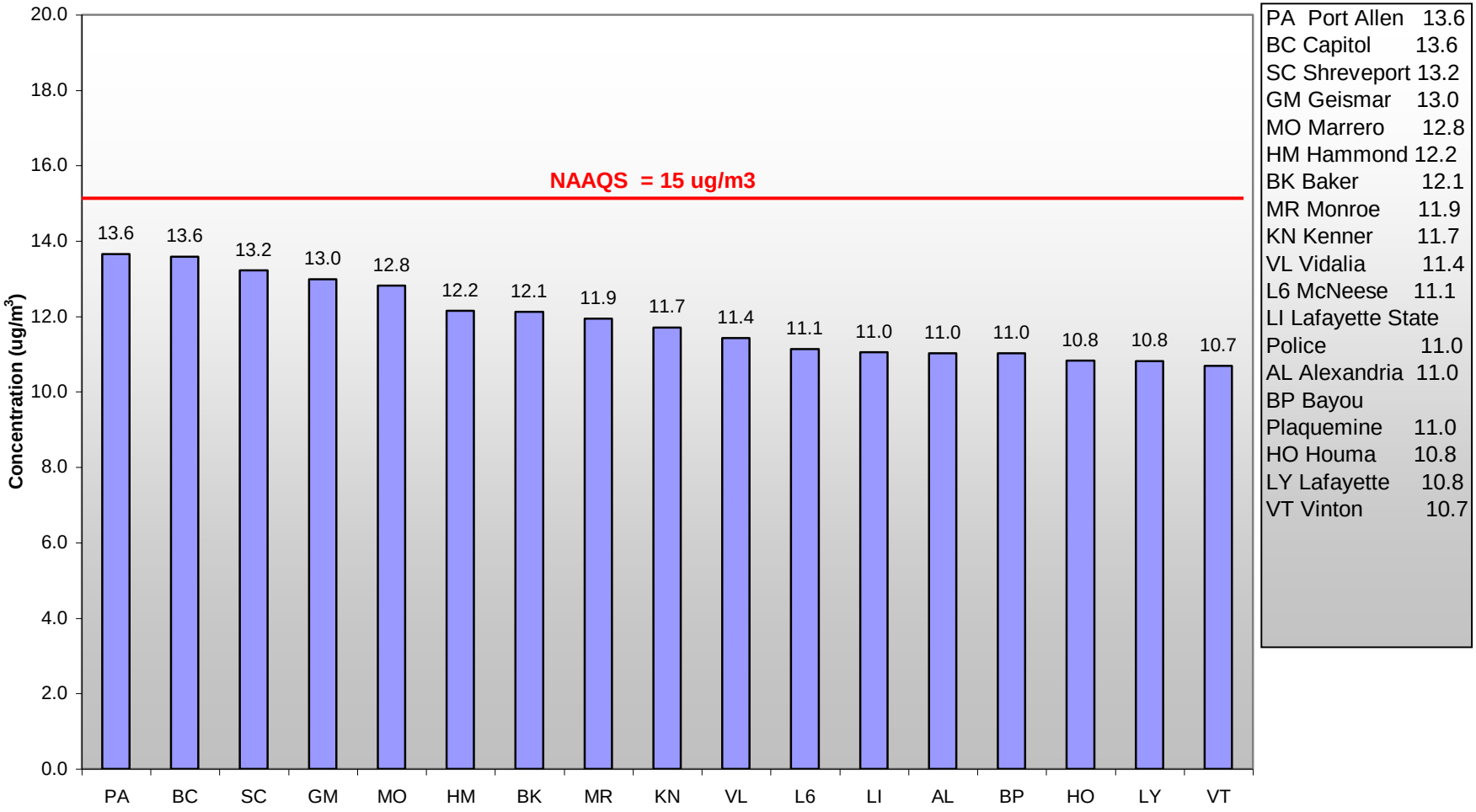


Figure 23. Louisiana $PM_{2.5}$ Three Year Average Annual Mean (2004-2006)

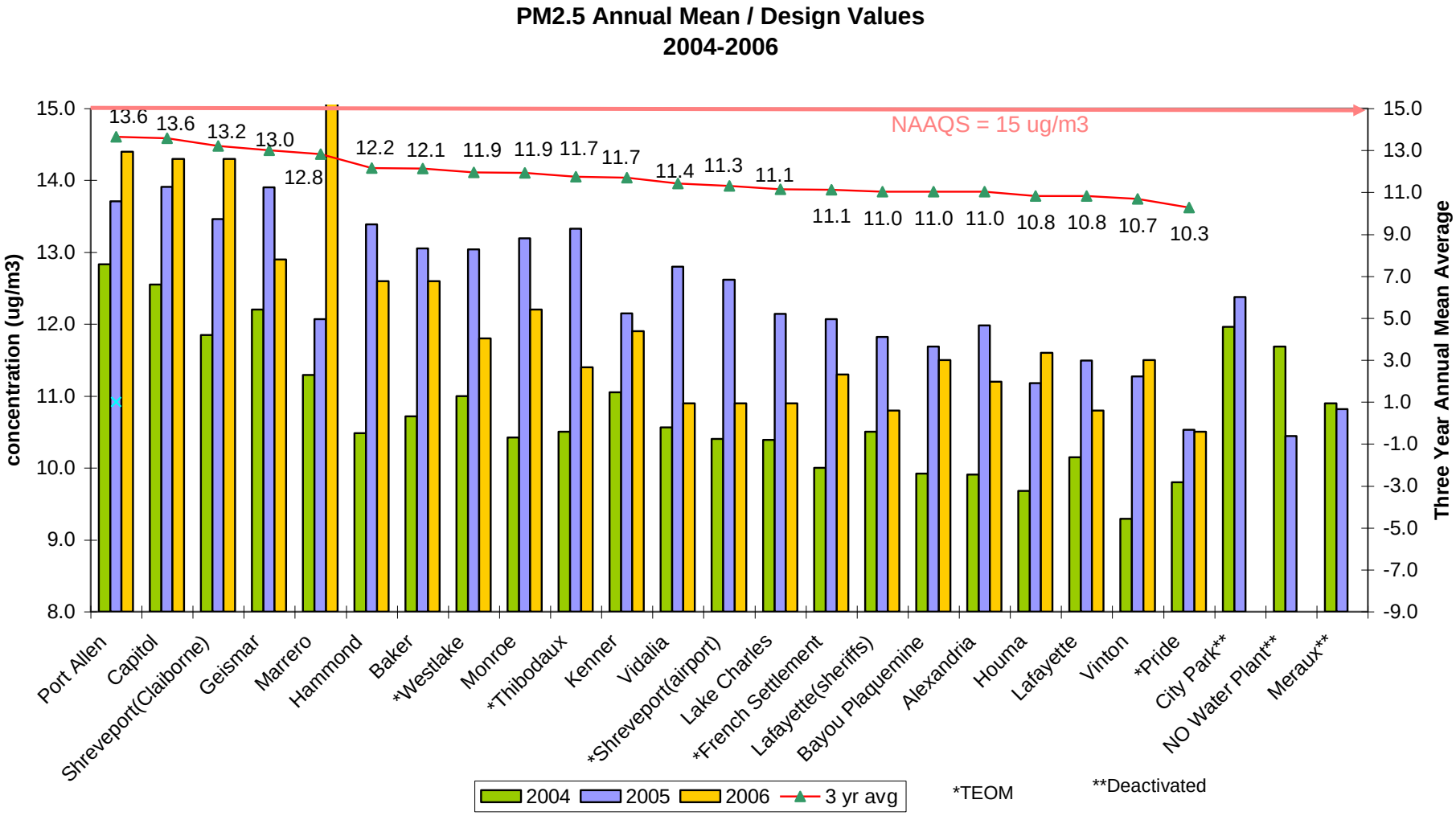


Figure 24. $PM_{2.5}$ Annual Mean 2004-2006

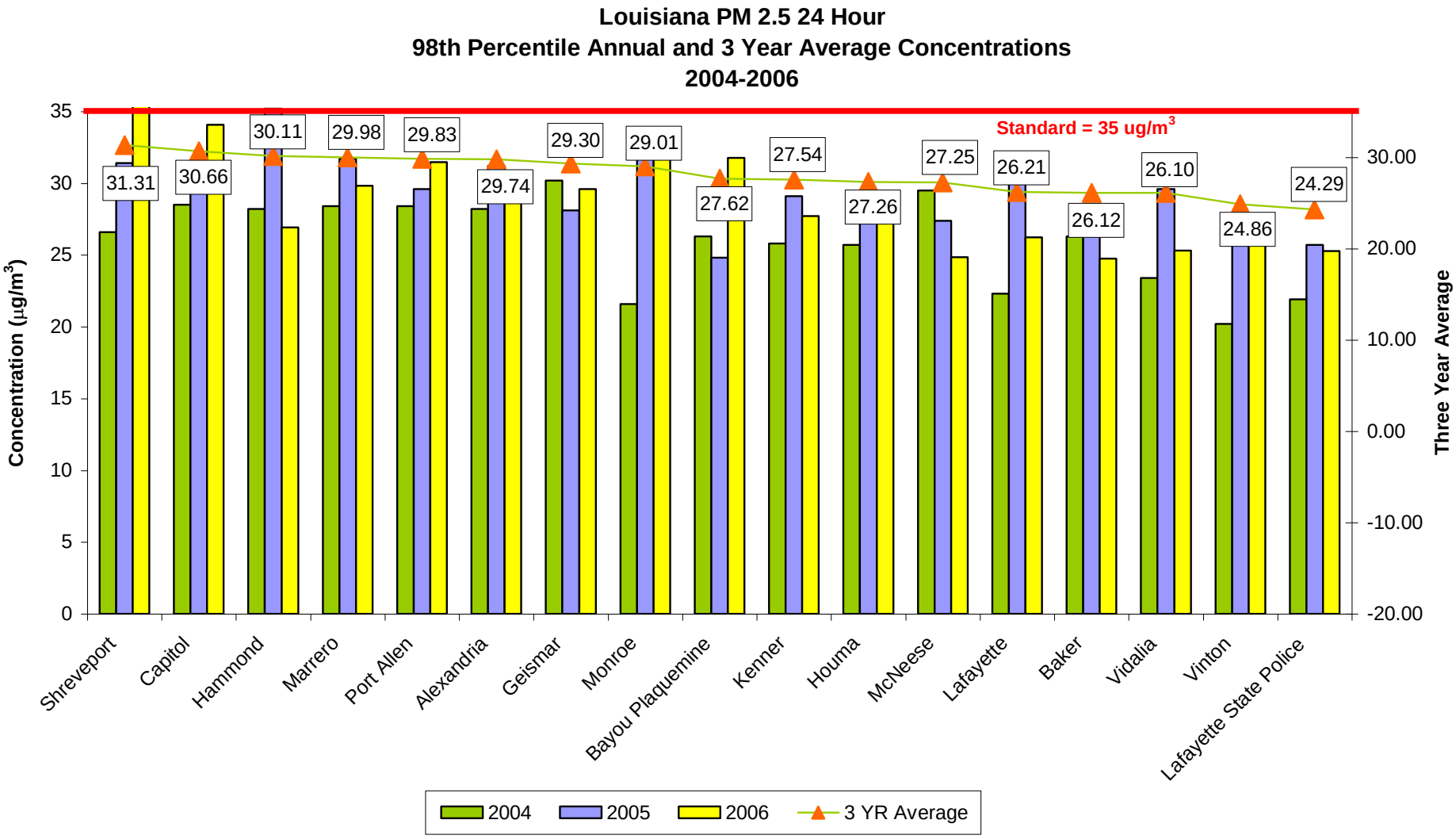


Figure 25. $PM_{2.5}$ 24-Hour Concentrations 2004-2006

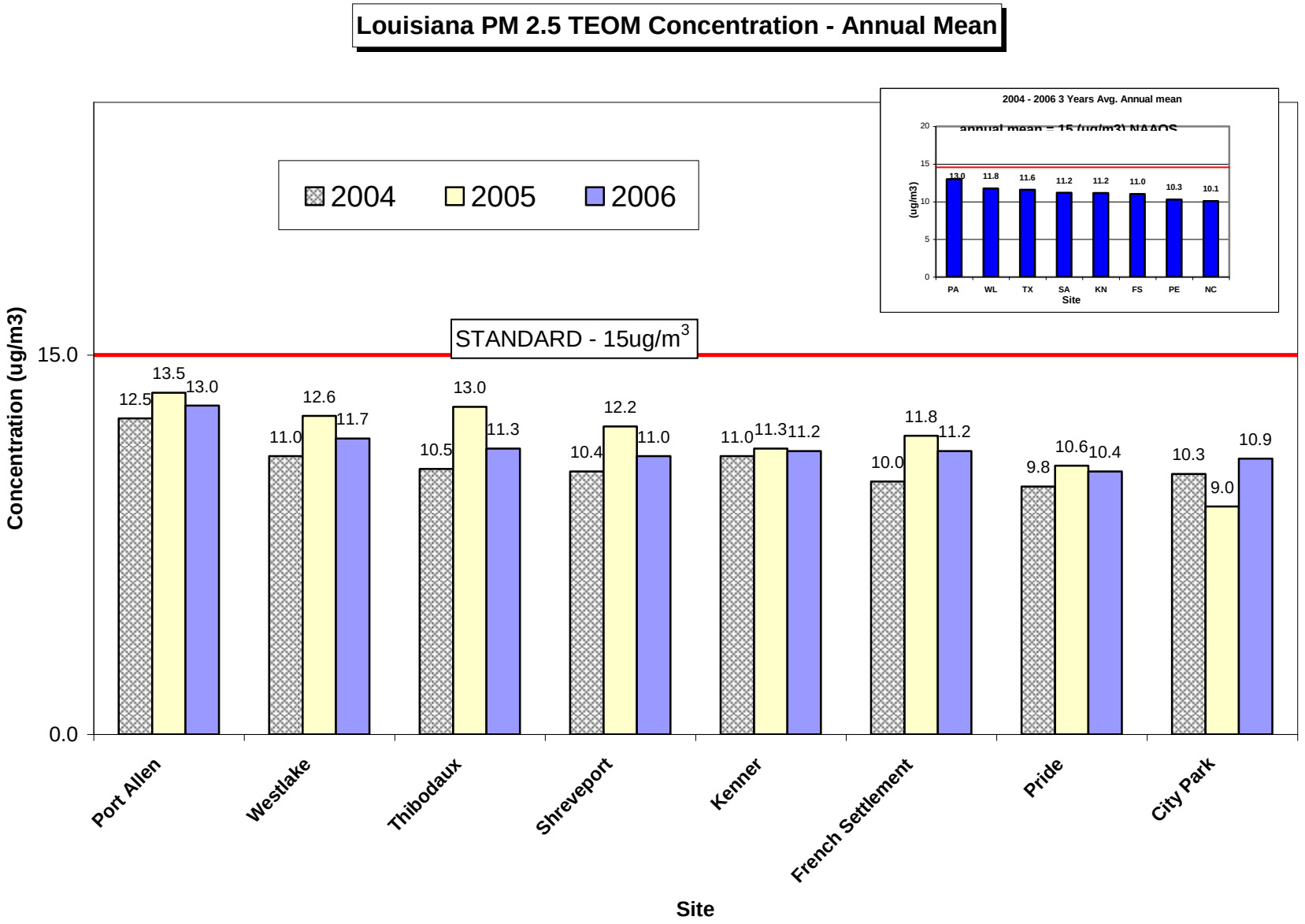


Figure 26. Louisiana $PM_{2.5}$ TEOM® Concentration - Annual Mean

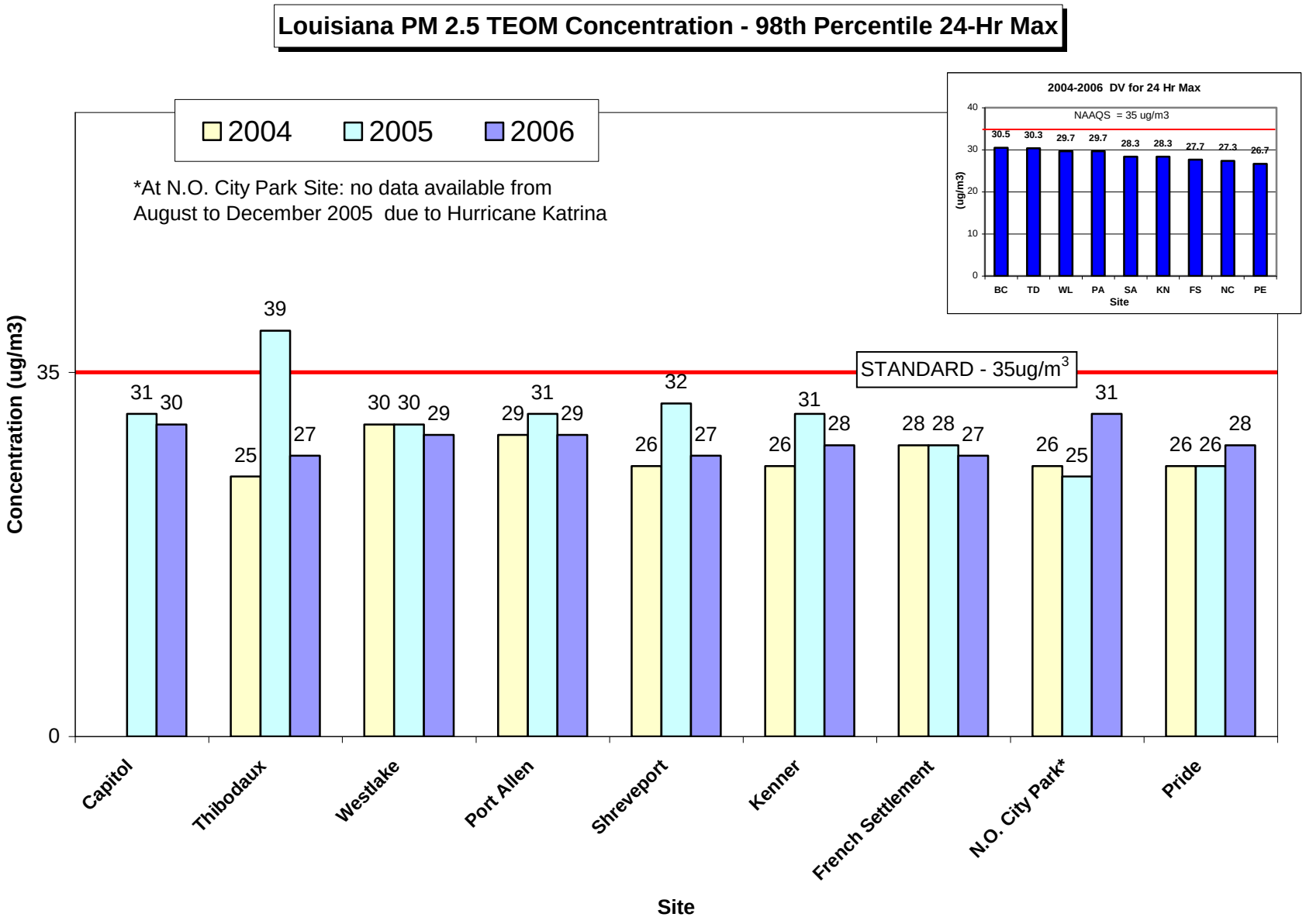


Figure 27. Louisiana $PM_{2.5}$ TEOM® Concentrations- 98th percentile 24-Hour Max

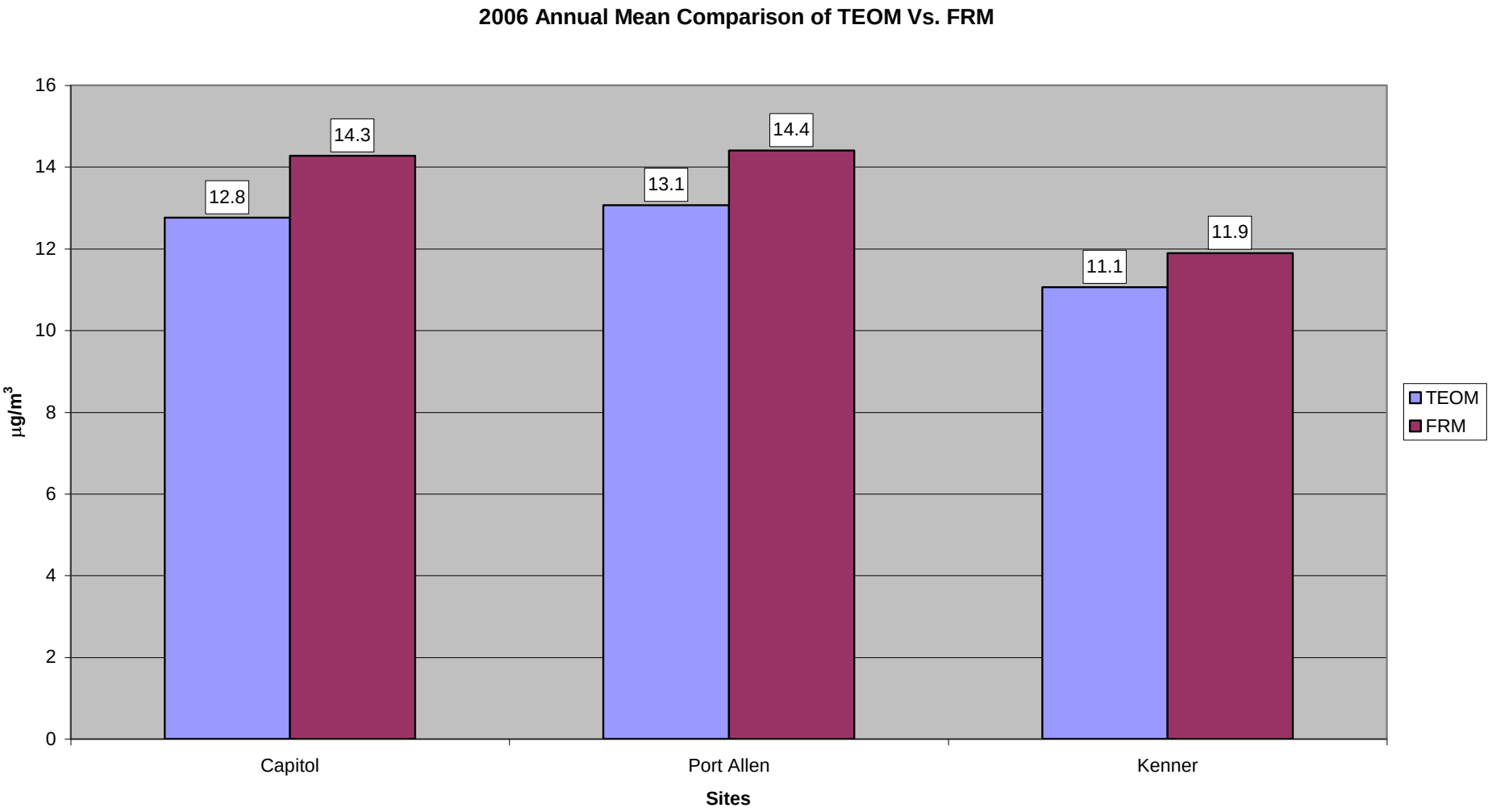


Figure 28. $PM_{2.5}$ Annual Mean Comparison of TEOM® Vs. FRM

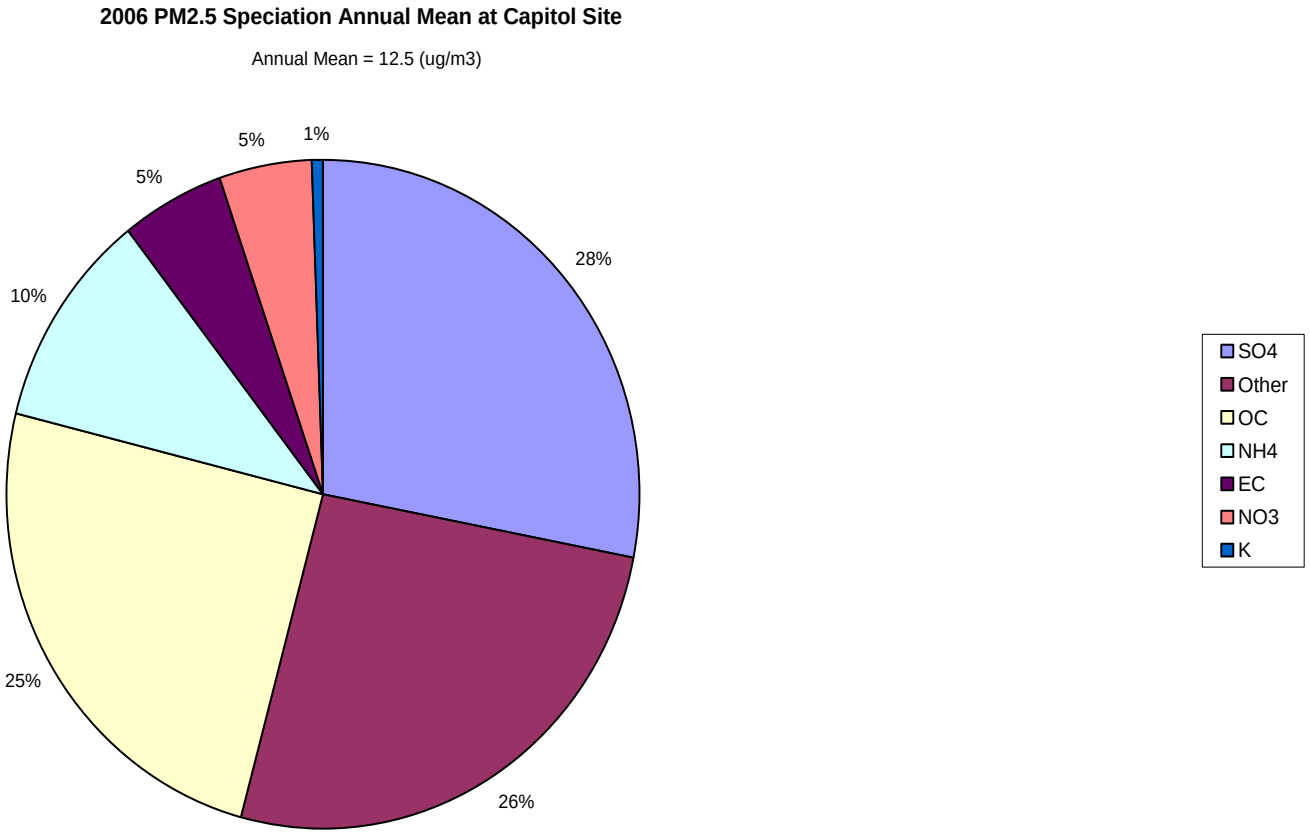


Figure 29. $PM_{2.5}$ Chemical Speciation Annual Mean - Capitol Site

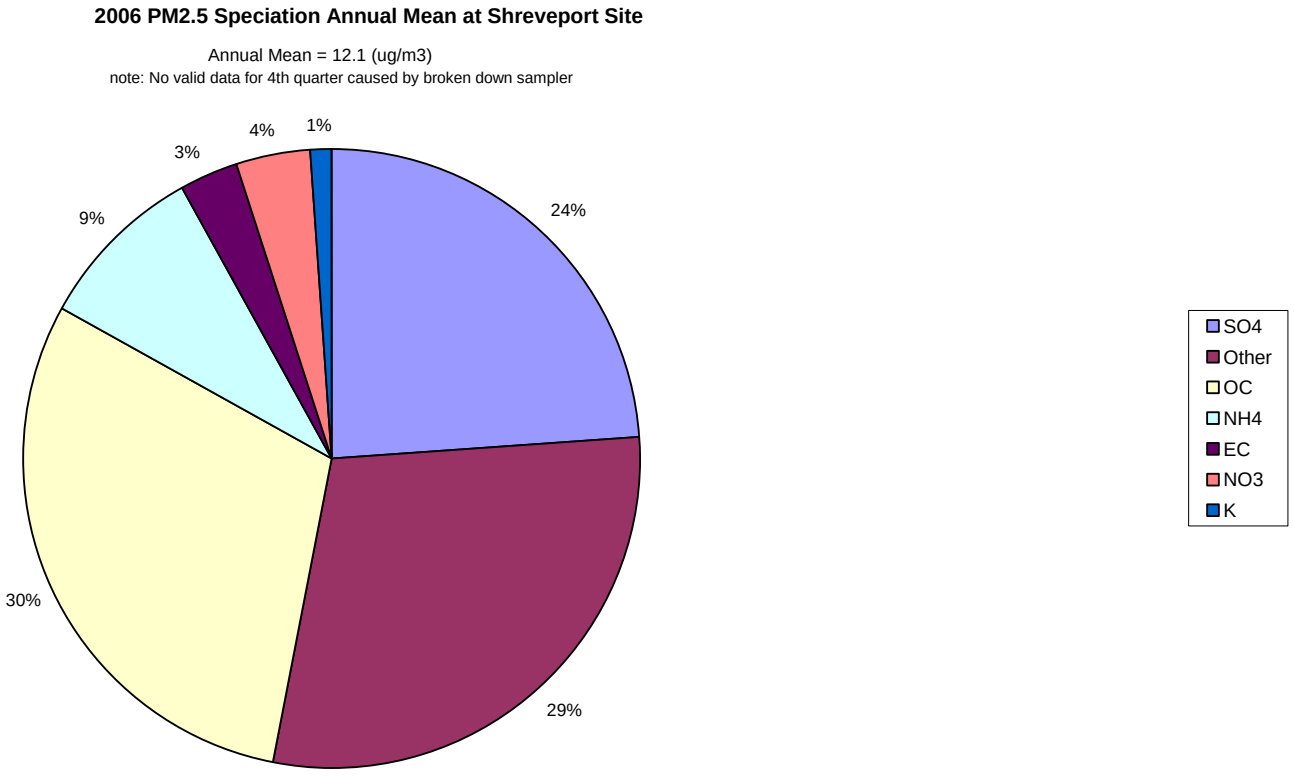


Figure 30. $PM_{2.5}$ Chemical Speciation Annual Mean - Shreveport Site